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A GUIDE TO ANTIQUITIES OF THE STONE AGE

In the Department of British and Mediaeval Antiquities

PLATE I.—FLINT IMPLEMENT FOUND IN GRAY'S INN LANE.
(Case 65, *see* pp. 6, 44)

A GUIDE TO ANTIQUITIES OF THE STONE AGE

In the Department of British and Mediaeval Antiquities

THIRD EDITION: 14 Plates and 220 Illustrations

BRITISH MUSEUM

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PREFACE

Since the second edition was issued in 1911, the provision of additional space has made possible a more logical arrangement of the exhibits ; and many discoveries at home and abroad have made it necessary to rewrite the Stone Age Guide. To include even a short description of each Case has meant severe compression ; and while special attention has been given to the British section, it must be understood that the Guide is intended to make known and interpret the Museum collection, not to cover the whole subject, on which several text-books are already in existence.

Many important questions in Prehistory are still under discussion ; and with no wish to decide between opposing schools of thought, a chronological scheme is offered (p. xiv) which seems to follow from recent excavations, especially those of Mr. Reid Moir in East Anglia. A word of acknowledgement is also due here to the Percy Sladen Trustees for their generous contributions in aid of prehistoric research.

The Stone Age of America is not included, as it is represented by series in the Ethnographical section under the charge of another Department. Many will also regret the omission of the magnificent bequest from Dr. Allen Sturge which came to the Museum in 1918 ; but for want of gallery-space it is only available to students on request, and to describe it would require a separate volume.

The exhibits in the iron gallery round the Prehistoric Room are now arranged according to countries, the large French section being in chronological order. The Guide here follows the sequence of Cases 99–152, but descriptions of certain exhibits below are interpolated, in order to preserve the geographical arrangement. To prevent disappointment, it should be mentioned that the Piltdown skull and implements, as well

as a fine series from the Drift and Cave-deposits, are exhibited in the Natural History section of this Museum at South Kensington, where a *Guide to the Fossil Remains of Man* is on sale, price sixpence.

In addition to previous acknowledgements the Trustees are indebted to the Councils of the following bodies for permission to use the illustrations given in brackets: the Society of Antiquaries (plates VI and VII, and twenty-eight figures in the text); the Royal Anthropological Institute (figs. 14, 201, 202); the Geologists' Association (pl. IV and figs. 42, 43, 55); and the Prehistoric Society of East Anglia (figs. 36, 71, 72, 74, 75, 76), the consent of the author having been obtained in each case. Fig. 83 is adapted by permission from a publication of the Tolson Museum at Huddersfield. Except those marked with an asterisk (*), the specimens illustrated are in the Museum, and the scale is generally indicated by a fraction which refers to linear measurement: thus, $\frac{1}{2}$ means that the original has twice the length and breadth, but four times the area, of the reproduction. Additional illustrations in postcard form are to be obtained at the Sale-counters in the Museum.

The present edition, which contains much new matter and 32 illustrations not hitherto published, is the work of Mr. Reginald A. Smith, B.A., F.S.A., Deputy-Keeper of the Department; and I have read through the proofs.

O. M. DALTON, *Keeper,*
Department of British and
Mediaeval Antiquities.

January, 1926.

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Penck and J. Geikie.		Flint Industries.	Geology, Climate, etc.
Achen, Bühl, Gschnitz, and Daun Stadia. Post-glacial: Neolithic. Turbarian and Forestian in Scotland.	Epi-palaeolithic.	Megalithic period: dolmens and long-barrows (Age of polished flint).	As at present.
		Shell-mounds: Le Campigny.	*Tapes-Littorina* in Baltic: coastal forests since submerged.
		Maglemose (harpoon-heads). Tardenois (pygmy flints). Mas d'Azil (transition).	*Ancylus* in Baltic: 25 ft. raised beach in Scotland.
Würm glaciation (Mecklenburgian).	Upper palaeolithic.	La Madeleine.	Ponders End: Barnwell Station deposit, Cambridge (low terrace deposits).
Riss-Würm interglacial (Dürntenian, Neudeckian).		Solutré. Aurignac.	Sands, loams, and gravels (upper loess = *ergeron*).
Riss glaciation (Polonian, Polandian).		Le Moustier (Middle palaeolithic).	*Cold.* Trail, Coombe-rock, Rubble Head: Upper Chalky Boulder-clay.
			Warm. As at Montières, Amiens.
Mindel-Riss interglacial (Tyrolian, Helvetian).	Lower palaeolithic.	La Micoque and Taubach.	
		St. Acheul.	Middle glacial sands and gravels. Lower loess on 2nd terrace (30 metres) at St. Acheul.
Mindel glaciation (Saxonian).			*Late.* Kimmeridgian Chalky Boulder-clay, Cromer Till (Contorted Drift).
		Chelles.	
Günz-Mindel interglacial (Norfolkian).			*Early.* Cromer Forest-bed: 3rd terrace (40 metres) at St. Acheul.
Günz glaciation (Scanian).		Pre-Chelles.	Weybourne and Chillesford beds: Red and Norwich Crags.
		Pre-Crag.	Coralline Crag.
		Plateau eoliths.	Pliocene deposits.

Note.—'Interglacial' means a less severe climate, not necessarily warm even temperate.

INTRODUCTION

In prehistoric study the first, and perhaps the last, difficulty is to distinguish between human and natural work in stone. The decision is fortunately least difficult in the case of flint which, in regions where it was procurable, was the favourite material in primitive times for many kinds of stone implements; but it is evident that the earliest effort of man to shape stone for his own purposes was only the slightest improvement on the natural product: hence the farther man's handiwork is traced backward in time, the less evidence will there be of his tool-making proclivities. The border-line is anything but certain, and in dealing with the earliest human work there is bound to be some difference of opinion; but general agreement has been reached with regard to human output during the Ice Age or Pleistocene period, and stone implements in geological deposits of that or later date are almost as good evidence of man's presence in a particular locality as the much rarer occurrence of his fossilized bones.

The recognized divisions of time before History are named after the principal materials used for the manufacture of tools, weapons, and utensils; and the Stone Age which preceded the use of any metal (except perhaps gold) is now subdivided into periods or phases and named generally after type-stations, or localities where the particular industry is best represented. These will be further noticed in the description of the exhibits, but the names of the three main divisions which are of older standing require some explanation. They must not be regarded as of universal application; though, where traces of prehistoric man are found, the cultures (if represented at all) seem to follow in the order given below, and to betoken a similar development towards civilization.

1. Eolithic, dawn of the Stone Age (Greek *Eos*, dawn, and *Lithos*, stone).
2. Palaeolithic, old Stone Age (Greek *Palaios*, old, and *Lithos*).
3. Neolithic, new Stone Age (Greek *Neos*, new, and *Lithos*), ending in northern Europe about 2000 B. C.

The titles of the second and third Ages were proposed by Sir John Lubbock (the first Lord Avebury) in 1865, and are now in general use, though not everywhere in the same sense. 'Eolithic' seems to have been first used by Gabriel de Mortillet in 1876, with reference to some alleged artifacts (specimens of human

work) of Oligocene date from Thenay in France; and the term has given rise to more discussion than the others, as it takes Man back to geological periods much more remote than the Pleistocene (p. 24), when the human race is now proved to have experienced the rigours of one or more Ice Ages.

To illustrate what may be called the grammar of the subject, a small series is arranged in Case A, exemplifying some of the technical terms which can hardly be understood without reference to the actual specimens. The terminology is not yet definitely fixed, at least in English; and the equivalents of the more usual French terms may be useful both to English speaking and foreign visitors to the collection.

Flint is a somewhat mysterious silicious substance ultimately derived from the upper zones of the chalk, and dating from Secondary geologic times; but much raw material was obtained by primitive man from the gravels, which consist of flint and other stones swept from higher ground into their present positions by the action of water. The question of mining, by sinking shafts into the chalk, to procure flint in a fresh and easily workable condition, is dealt with later (p. 79).

By natural fracture is meant the splitting of stone by some means other than a direct blow from the hand of man; and this may occur before the flint leaves its original bed, through earth-movements that crack and produce 'faults' in the chalk. The results of such pressure are sometimes surprisingly like human work. When exposed on the surface, flints are often fractured by unequal expansion of the mass due to alternate heat and cold; by fire, which does not always imply human agency, but may be due to lightning, friction, spontaneous combustion, or other natural causes; and more especially by frost, when particles of moisture enclosed in the stone expand forcibly on conversion into ice. Fall from a height and impact with other stones on a beach are also natural agencies; and a secondary chipping not unlike human handiwork, but solely due to battering by the waves, is often noticed on pebbles of the shore.

The effect on flint of a sharp and somewhat heavy blow, such as that of a hammer, is easily recognized, and may be regarded as proof that the stone has been handled by an intelligent being. A 'bulb of percussion' is the characteristic mark of a worked flint, and is produced on the flake struck off the core (as figs. 1 and 23), just below the point where the blow is delivered, but to produce this effect the hammer must fall on a flat surface of flint; and a series of flakes is obtained, one at a time, by striking near the edge of the core, the bulb of percussion leaving a corresponding hollow (the bulbar cavity) on the core or nodule. The inner or flat face of a flake (known as the bulbar face or cleavage plane) has, therefore, the bulb at the butt-end; and the outer face shows

either the original crust of the flint block, or, if already worked, one or more ribs in the direction of its length, marking the edges of flakes previously struck off.

It is on simple flakes rather than on axe-heads, knives, or arrow-heads that the bulb of percussion is visible, since the majority of implements have been subjected to a secondary process of chipping, so that the original bulb or corresponding cavity is effaced during manufacture. The finer chipping seen on some of the most highly finished specimens is not, however, effected by

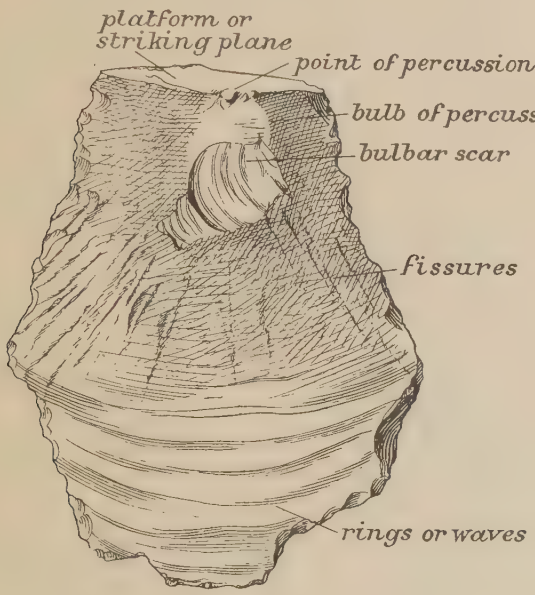


Fig. 1.—Diagram of technical terms.

blows, but more probably by pressure (fig. 2), either by means of a flint 'fabricator' (fig. 3) or a tool of bone, wood, horn, or other material.

When a piece of tabular flint, flat with the two faces parallel (like a tile), is struck at or near the centre by a pointed hammer, a conical piece of flint falls out below (fig. 4), its apex being the point hit by the hammer; but when the blow is delivered near the edge there is no room for a complete cone, and the resulting bulb of percussion may be regarded as part of such a cone. Normally there is a small groove or cavity (the bulbar scar, French *éraillure*) produced involuntarily on the bulb, which is sometimes explained as the effect of recoil from the blow, and interrupts the

rounded surface of the bulb (fig. 1). Further, the blow produces sometimes fissures or grooves on the bulbar face of a flake, which

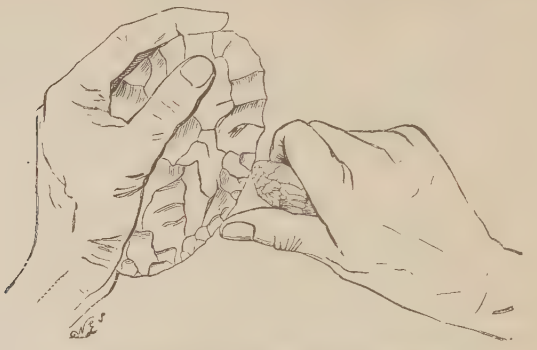


Fig. 2.—Mode of flaking flint by pressure.

Fig. 3.—Flint 'fabricator', Suffolk. ($\frac{2}{3}$)

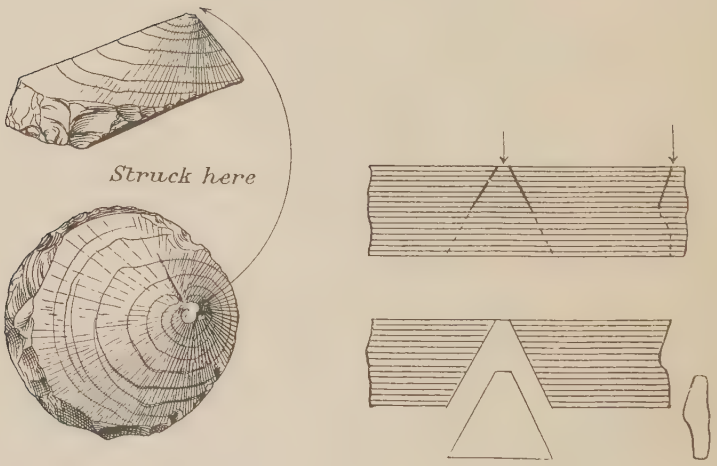


Fig. 4.—Diagram of the cone of percussion.

radiate from the point of percussion as centre; and waves or corrugations, with the same point as their common centre, are often produced owing to this conchoidal fracture of flint, the rounded

effect on the edge of the flake being known as a hinge-fracture, which is sometimes erroneously attributed to intentional grinding or polishing. The fissures and concentric rings are useful in corroborating the evidence of human work furnished by the bulb of percussion; and a 'struck' or 'human' surface can often be recognized by its superior lustre (as opposed to 'gloss' or 'polish'), the surfaces due to the natural break-up of flint (thermal fracture) being normally dull and rough. But no test of human work in flint is infallible, whether alone or in conjunction with others; and a small minority of specimens will always be in dispute.

Palaeolithic implements are often 'rolled', that is, battered by other stones during the deposit of gravel in a river, and neolithic specimens are often polished all over or at some points; but apart from this many of both ages have their edges softened, the surface more or less lustrous, and the original black or brown of the flint discoloured. These chemical or molecular changes often produce pleasing colour effects and are known as 'patina', an indication of great antiquity and probably of prolonged exposure to the elements. This alteration of the surface is not necessarily due to contact with the deposit in which the implement is found, otherwise all found in one bed of gravel would be similarly stained. Such is no doubt the case with plateau gravel in Kent, where the ochreous patina is general, but it is clear from such deposits as Warren Hill, Suffolk, that the worked flints had acquired their present varied patinations under different atmospheric conditions before being finally buried in the gravel. On the other hand, worked flints in a chalky soil usually have a white surface—that is to say, decomposition has reached a certain depth, leaving only a black core; and it is possible that contact with chalk accelerates this change in the nature of the stone. A large number of implements have been removed from clay and brick-earth with their surface unaltered in any way, and it is only by their undoubted discovery in certain positions that such specimens can be distinguished from modern productions.

A series of specimens collected by Mr. S. B. J. Skertchley and published in a memoir of the Geological Survey of England and Wales, illustrates the modern methods of flint-working which are found to offer a remarkable resemblance to the processes adopted by neolithic man. The similarity extends to mining the material in the upper levels of the chalk, the form of the pick used by the miners, the shapes of many of the worked flints, and (until recent times, when the French flaking-hammer was introduced) the use of a round-headed hammer. Before the introduction of iron, a pebble of hard stone, such as quartzite, was used for flaking, and the ends of specimens shown in Case A are bruised in that way. It is by no means improbable that many of the 'fabricators' belonging to the Stone Age were really used in

conjunction with nodules of iron pyrites for producing fire (fig. 5), and it may be pointed out that the gun-flint is only a variety of the domestic strike-a-light.

A small series of palaeolithic implements is exhibited in Case A to illustrate certain characteristics, colours, and surfaces, due in a great measure to their great antiquity, and not to be found in the majority of neolithic implements, which belong to a comparatively recent period. A split specimen will illustrate the difference between the interior and exterior of a palaeolithic implement, and the modern flint-knapper's raw material shows the depth to which the flint has decayed and changed from black to white. This is the fundamental meaning of patination, as it is not till that change in the surface of flint has been effected, that staining by contact with minerals (such as iron in gravel) can produce the wide range of colours seen in palaeolithic implements. Some varieties of patination are illustrated on pl. II: no. 1, different shades due to

Fig. 5.—Flint and pyrites for striking fire, Yorks. (⅔)

flaking at more than one period; no. 2, a tangle of white lines (sometimes called 'basket' patina), showing a stage in the transformation of the surface from black to white; no. 3, a spotted effect of indigo and yellow, most common at Warren Hill, Suffolk; and no. 4, white 'spider-web' markings on an ochreous ground, characteristic of eoliths.

These useful but imperfect tests of human workmanship were not applied in the early days of prehistoric research; and the first discoveries that can be verified were of implements so carefully finished that an artificial origin was obvious and their preservation thereby ensured. The leading examples are included in this collection, and come from English soil, the first discovery of this kind dating from the end of the seventeenth century. A finely chipped implement of flint (*frontispiece*, Case 66) was found near an elephant's skeleton opposite to Black Mary's, near Grays Inn Lane, London, and was described as a British weapon. The site was near Bagnigge Wells, now King's Cross road, opposite Granville Square, about 50 feet O.D.; and the elephant was no doubt a mammoth, contemporary with the implement, which was

PLATE II.—SPECIMENS OF PATINATION IN BRITAIN. (½)
(Cases 62, 65, 68, *see* pp. 6, 58, 31, 56, 23)

left on or near the former bank of the Thames, and subsequently covered with gravel, like the Lower Clapton group in Case 63. The true significance of worked flints was not, however, recognized till a century later, when Mr. John Frere, in describing his discoveries at Hoxne, Suffolk, in 1797, referred these implements (Case 65) 'to a very remote period indeed, and to a people who had not the use of metals'. A small triangular implement (fig. 6) was found in 1830 at Dallow Farm, Luton, when Schmerling was investigating the cave-deposits of Belgium, and some years before Boucher de Perthes (1788–1868) extracted large quantities of

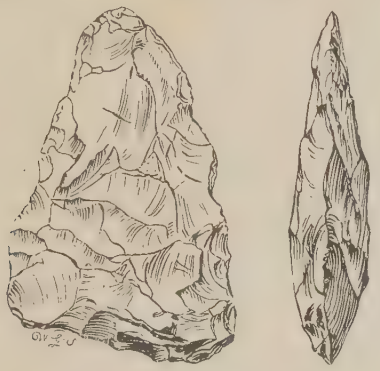


Fig. 6.—Implement found in 1830 at Dallow Farm, Luton. ($\frac{1}{2}$)

implements, evidently fashioned by the hand of man, from the gravel deposits of the river Somme at Abbeville. The conclusions met with violent opposition but were established about 1847, from which time the existence of similar deposits has been demonstrated in many parts of the world, and a close connexion proved between these relics of human industry and the bones of animals, many of which are now either extinct or living only in remote latitudes.

It has been objected that the presence of mammalian bones does not prove that animals now extinct were living here while the gravels, sands, and clays of our river valleys were being deposited by Pleistocene flood-waters; but the repeated discovery of parts of the skeleton in their natural relation to each other shows that the flesh was still on the bones when the carcase sank in the water, so that we cannot consider them as stray fragments washed out of an older stratum. The remains of extinct mammals not only indicate changes of climate, but also date the implements of primitive man found in association with them, archaeology thus helping the geologist to classify and date the various deposits laid down since (and perhaps before the end of) the Tertiary period.

The commonest implement in early palaeolithic times is the 'hand-axe', a term which was offered in the first edition as a free translation of the French *coup-de-poing*. At that early date it is supposed that hafting was unknown, and the typical implement was held in the bare hand, or possibly thrown from the hand; but though the hand-axe can be easily recognized it is difficult to define it or explain its precise use or uses. Some light has however been recently thrown on its origin by the discoveries of Mr. Reid Moir, who claims that it was gradually evolved from the still more primitive form named by Sir Ray Lankester the ros ro-carinate or eagle's-beak implement (fig. 13). Even this is thought by some to have been preceded by an implement of quite different character, the eolithic flake detached by natural forces but dressed by man round the edge with almost vertical flaking (fig. 12); and it is now necessary to link up the early succession of flint implements with the geological changes that can be recognized in Great Britain and in Europe generally.

Several attempts, beginning with Gabriel de Mortillet's in 1869, have been made to harmonize the evidence derived from various quarters with regard to the early prehistoric periods: and a notable effort was made in 1922 by Prof. Fairfield Osborn to combine the geological, climatic, faunistic, botanical, and archaeological material with Prof. Depéret's theory that the terraces observed on the Mediterranean and Atlantic coasts as well as along the lower courses of the more important rivers, were due to the rise and fall of sea-level. But in Scandinavia and Great Britain, for instance, one part of the country rose while another sank below the sea (the pivot running east and west through the Danish islands and Flamborough respectively); and allowances should be made for differential movement of the land, as well as the changes of sea-level due to the accumulation of water at the poles in the form of ice, and its return to the ocean in interglacial periods. A working theory is necessary, and a scheme that has much evidence in its favour and is partly in agreement with some of the Continental authorities is given on p. xiv. It is based for the most part on Mr. Reid Moir's discoveries of human work in East Anglia, at geological horizons which till recently were regarded as long anterior to the human period, and some of the leading names in Prehistory are at last ranged on his side, the result being that England is now recognized as the most favourable field for the pursuit of primitive man.

As the relation of man to the Ice Age is a subject of perennial discussion, a summary of recent research may here be given in order to indicate the lines on which an ultimate correlation may be reached. The remarkable results achieved by Penck and Brückner in the Alps may serve as a basis for the chronology of northern Europe, as the number of major glaciations during the

Quaternary (Pleistocene) period must be limited, and traces of the greatest should easily be recognized in all the areas affected. Unanimity has not yet been reached, but the attention now being devoted to the subject cannot be without result.

The names of the glaciations are derived from tributaries of the Danube along which the morainic deposits are best exhibited in each case; but for English readers it is best to retain intact the South-German river names and French site-names, without any attempt to form adjectives from them, as is done with more or less success in other languages. It should be remembered that during the Palaeolithic period Britain had not been finally separated from the Continent by the Straits of Dover; and consequently the civilization, climate, fauna and flora of southern England must have corresponded closely to those of northern France. A Channel River flowing towards the Atlantic was of old standing; but the chalk bridge seems not to have been broken or submerged till the end of the palaeolithic Cave-period.

Periods of intense cold were not confined to the Great Ice Age or Pleistocene period and can be traced in certain beds of the preceding Tertiary period; and it may well be that the first great glaciation, named by Penck after the river Günz, can be identified in East Anglia (p. 27). At one period this country was invaded by the ice and its products as far south as the Thames; and our northern counties, with the exception of the highest mountains, were covered with a great ice-sheet, which is proved to have been 1600 feet deep near Shap, Westmorland, by scratched rocks high up on the mountains; 2300 feet in the West Riding and the Cheviots; 3000 feet in north-west Scotland, and twice that thickness in Scandinavia. That the ice thinned out towards the south is shown by the distribution of the Boulder-clay, a glacial deposit which is not found south of London, but occurs sometimes in successive layers farther north. This goes to show that there were comparatively mild periods in the Ice Age, the glaciers temporarily retreating northwards; but the subsequent disturbance of the various deposits renders a complete record of these climatic changes impossible.

That the temperature was not uniform is, however, sufficiently shown by the frequent discovery in the river-gravels, along with temperate species, of remains of animals now either extinct or living only in extreme climates. A rough classification is given below, and it is only necessary here to point out the most important associations and their succession. Of these animals several, such as the stag, roe-deer, cave-bear, urus, horse, hippopotamus, and straight-tusked elephant, occur in the Cromer Forest-bed, and are thus proved to have existed before the great Ice Age. It may be observed that all the pre-glacial animals represented at the present day point to a temperate or moderately warm climate;

while later arrivals like the reindeer, musk-sheep, marmot, and lemming are specially adapted to sub-arctic conditions. The earliest palaeolithic fauna indicates a warm and moist climate, and includes the straight-tusked elephant (*antiquus*), the leptorhine rhinoceros (also called *Rhin. merckii*), the large hippopotamus, the giant beaver, sabre-toothed tiger, and striped hyaena. Next, in a cold and wet climate, lived the mammoth (*Elephas primigenius*), the woolly rhinoceros (*tichorhinus*), the cave-bear and spotted hyaena, and the Irish elk; and in the steppe period, cold and dry like northern Siberia at the present day, the leading species were the reindeer, saiga antelope, ibex, musk-sheep, lemming, marmot, glutton, and the arctic hare and fox. There was probably a cycle of climatic changes, tundra to steppe, forest, steppe, and back to tundra, but the above summary fairly represents the fauna in the early, middle, and late palaeolithic period respectively.

Fig. 7.—Palaeolith found near Lincoln. (2)

The presence of the ice-sheet and of glaciers is generally recognized as a sufficient explanation of the absence of palaeolithic implements in Scandinavia, in Ireland, and the north of Britain; and English finds appear to be mainly confined to the area south of a line drawn from the Wash to the Bristol Channel, though in recent years examples have been found beyond that line. A careful examination of the old gravels of the River Rea at Saltley, Warwickshire, has brought to light a well chipped implement of the Drift type, not indeed of flint, but of quartzite pebble, which suggests a connexion with the implements and flakes of that material found in the lower levels of the bone caves of Creswell Crags (Cases 71, 72). Undoubted flint implements of palaeolithic type have also been found at Lincoln (fig. 7) and at Huntow, near Bridlington, E. R. Yorks: others at Chester and in the Severn gravels near Worcester; but these still constitute a small minority. Nevertheless there are sufficient reasons why implements of the Drift period should escape notice in the north, if they were ever manufactured in that region. Flint is extremely rare over a great part of the area; and where other stone is used the evidence of human workmanship is not so conspicuous. Owing to the nature of the rocks the alluvial deposits differ from those in the south, and are not so frequently excavated for economic purposes.

Geologists now divide gravels with their associated loams and sands into two main classes, but no longer maintain that one set

of deposits was laid down before the deposition of the other set began. The first division is called Glacial, because the deposits often include boulders too large for ordinary river transport, and striated rocks that can only be due to ice action: such gravels are mainly found on the plateau or high ground, above the valley deposits which rise to a maximum of over 100 ft. above the present river-level. Fluviatile or terrace-gravels form the other division of the Pleistocene Drift, and are found in tiers on the flanks of river-valleys, generally at constant heights above the river level. Thus in the upper Thames, from its source down to the Goring gap through the Chilterns, terraces are normally found at surface heights of 100 ft., 50 ft., and 20 ft., though subsequent erosion has destroyed their continuity.

It is now maintained that terraces are principally due to the varying erosive power of the river consequent on earth-movements, or in some cases to differences of sea-level. There are no doubt exceptions to the rule, but it is probable from the accompanying

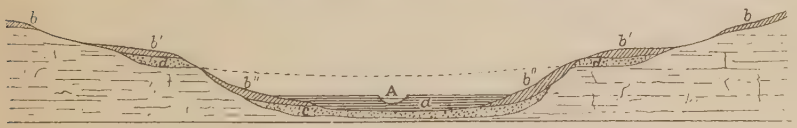


Fig. 8.—Section of river-valley, showing terraces.

A. Present river; *a*. Recent alluvium; *b*, *b'*, *b''*. Brick-earth on different levels and of different ages; *c*. Low-level gravels; *d*. High-level gravels.

diagram (fig. 8) that the higher terraces were formed before the lower, and consequently the higher the position of the terrace-gravels the greater must be the antiquity of the implements or other remains of man contained in them, supposing no disturbing agencies to have been at work. The whole valley may, however, have been filled up by ice or glacial drift and excavated again as a consequence of one or more glaciations. Other things being equal, the higher the land the greater is the rainfall and the steeper are the drainage slopes. Increased volume of water combined with steeper gradients would result in more active erosion of the channel; and the terrace-deposits are regarded as marking intervals between periods of maximum erosion, the latter being represented by the steeper slopes. The lower Thames (fig. 9) is a good example of these phenomena, and the accompanying diagram (fig. 10) shows how far the bed has been raised and lowered in recent geologic times by earth-movements and the action of its own stream. The altitudes given are only approximate, but it may be taken that the highest terrace, with its surface 130 feet and more above present sea-level (zero in diagram), formed part of a very ancient bed of the Thames when the land was correspondingly lower. An elevation of about 30 feet ensued, and the centre

of the river-bed was rapidly eroded to the base-level, represented by the 100-feet terrace (the high or upper terrace now called after Boyn Hill, near Maidenhead). An elevation of 90 feet and subsequent erosion to base-level produced the middle or 50-feet terrace (known as the Taplow terrace), the middle portion of that bed being eroded another 20 feet by an upheaval of corresponding extent. After an interval represented by the 10 25-feet terrace, there was again an upheaval of the land, and to reach the sea-level once more the river had to cut away 60 or 70 feet, thus reaching its lowest bed (the sunk channel) far below the present level. Since that remote time there has been a depression of the land, and the river bed has been gradually filled up by silt, the stream having lost its enormous powers of erosion by the reduction of gradients along its course. As a torrent the river would not only excavate rapidly, but transport large stones which would be rolled in the process and become pebbles. As the stream slackened on

Fig. 9.—Section of lower Thames valley, with terraces
(*after Messrs. Hinton & Kennard.*)

1. High terrace; 2. Middle terrace; 3 Third terrace; 4. Gravel in buried channel; 5. Holocene alluvium; T. Present river Thames; *a*. Ancient high-level drift; *b*. Minor terrace.

approaching its base-level, smaller stones only would be carried along the bed, and eventually there would be a deposit of sand when the flow reached its minimum. On the terraces the deposits often show this succession, the coarser material below and the finer silt above; but besides the gravels there are often beds of brick-earth and mud, due to floods and other disturbing causes, which are still a problem to geologists.

The above outline is given merely to suggest the enormous antiquity of the terrace deposits and consequently of the human relics contained in them. Reference may be made to the relief-map of the lower Thames basin affixed to the wall next Case 64, where the various deposits of the Thames are indicated by colours. It must be remembered, in estimating the volume of a river in palaeolithic times, that though the upper terraces were formed and left dry (except when below the flood-level) before the deeper part of the valley was excavated, yet the river at no one period occupied the whole of the valley between the uppermost terraces, and only laid down the present expanse of gravel and brick-earth by constantly shifting its meandering course. However, the flow of water, due to extraordinary conditions in the present drainage

areas, must have been enormous; and there are abundant traces of an Ice Age which would account for the great breadth of the older river-valleys, and the deposition of huge sheets of gravel even on the high ground above them. A plateau deposit like the outwash-fan of a glacier would cover any or all of the terraces already cut by river-action, and perhaps provide a bridge for itself by filling up a valley.

It is an established fact that flint implements are more frequently found in valley-deposits than elsewhere in Britain, and several explanations have been offered of this curious distribution. Should height above sea-level be regarded as a measure of antiquity, the more ancient inhabitants of the plateaux and hills being fewer than their successors by the river-side? This theory is negatived by the frequent occurrence of *late* Drift implements in gravel on the high ground at a distance from

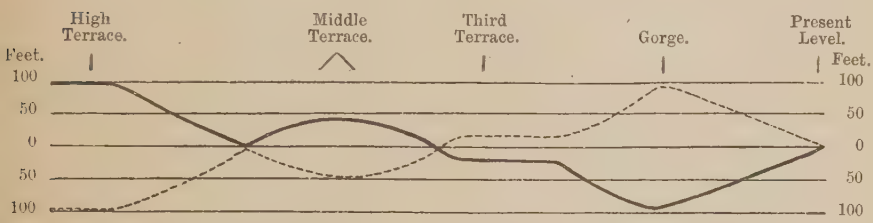


Fig. 10.—Diagram showing changes in lower Thames valley
Thick line = base level of erosion from High Terrace times. Dotted line = corresponding altitude of land above the sea (*after Messrs. Hinton & Kennard*).

any river, and a gravel is dated by the latest type it contains. Again, if implements were originally left scattered over hill and dale alike, they might have been swept into the valley gravels by widespread floods due to the melting of glaciers; or Drift man may have lived chiefly on river-banks to obtain fish and water, only using the higher ground for hunting purposes. In both these cases, however, the presence of late specimens above and away from the river-valleys is not easy to explain. It should also be remembered that valley gravels are normally thicker than those on the plateau, and are therefore more often utilized commercially, the result being that many more implements would be found beside the rivers than in the shallow and unprofitable beds of the uplands, even if one occurred in the same number of cubic yards.

Reference to the table on p. xiv will familiarize the reader with the few French place-names that have been used to denote successive periods of the old Stone Age. Most of them were selected as typical by Gabriel de Mortillet who published the first system

of this kind in 1869, but much has been revealed since then, and something must now be said as to the origin and spread of the various 'cultures' or ways of life denoted by the place-names. The Eolithic is highly controversial and is noticed elsewhere (p. 21); but most are content to apply the name of Chelles (on the river Marne ten miles above Paris) to the earlier group of hand-axes and associated worked flints from the Drift. Its pronunciation (Shell) may occasionally give rise to ambiguity in English, but even that risk is preferable to the use of Chellean and other adjectival forms, which are contrary to the English practice and render uniformity impossible. The simple place-name can be used almost invariably, just as an Englishman would speak of Nottingham lace or Devonshire cream.

The Chelles hand-axe is, in Europe, only represented in Italy, Spain, France, and England, and is now thought to have been introduced from the South by way of Asia Minor, Syria, and North Africa. The culture was consequently not indigenous, and as it is associated in the gravels with animals indicating a warm climate (generally called a 'warm fauna'), a migration northward may be assumed in consequence of favourable conditions in Europe at that time. The period is at present uncertain, and some authorities recognize a pre-Chelles industry of the same general character but less advanced technique; but a fixed point in geology may be found for it in the Cromer Forest-bed, an East Anglian deposit dating from the time when the Rhine skirted the east coast of Norfolk. Chronological alternatives are given in the text-books, but, this is the basis of the scheme on p. xiv.

The later Drift implements and the culture they represent are named after St. Acheul, a suburb of Amiens, famous for its flints since the days of Boucher de Perthes and subsequently explored with great patience and success by the late Prof. Commont. St. Acheul types show a gradual improvement in form and chipping (p. 27), and the development no doubt took place in Europe and Africa concurrently though on somewhat different lines. According to Prof. Obermaier the western type of St. Acheul culture spread from France north-east into Germany; the southern passed from Asia Minor into the Hungarian plain, and the northern from the heart of Russia into south Germany. The climate meanwhile deteriorated and in late St. Acheul times the approach of arctic conditions becomes noticeable. Which glacial period followed in the period of Le Moustier is a matter of discussion (p. 53), but there is no longer any doubt that the culture of Le Moustier had already been long established in central Europe (as at Taubach and Ehringsdorf, both near Weimar, with warm fauna) before the Neanderthal race (p. 18), on a much lower plane of human evolution, moved westward and superseded the race of St. Acheul. The change from a core-industry to a flake-industry is noticed below (p. 32).

both being recognized, and distinguished from each other, in many parts of the world. In Europe the spread of Le Moustier, to the south-east, south, and west was probably due to an extension of the ice-fields, which impelled both man and beast to seek habitation much farther south than formerly. Though Le Moustier is found with a warm fauna on the Riviera, the continued cold drove the reindeer to Mentone and the Cantabrian coast of Spain during the succeeding period of Aurignac.

It is the opinion of many well qualified to judge that the period of Le Moustier or Neanderthal man coincided with the Würm glaciation; and Prof. Obermaier's view is that while the Alpine and Scandinavian glaciers were threatening southern France and the whole of northern Europe in their successive periods of advance which are known as the first, second, and third glacial stages (p. xiv), living conditions still allowed the inhabitants of France and Spain to dwell in river-valleys and to resort for protection to shelters on the sunny sides of cliffs and mountain slopes. On this theory it was only during the fourth glaciation (Würm) that life in the open became impossible—at least during the winter months—and that the prehistoric period of the Cave-man began.

The earlier researches of geologists in these ancient habitations had been undertaken chiefly for the purpose of adding to our knowledge of the extinct mammals, without any idea of man having been their contemporary. The fact that the mammoth, the cave-bear, woolly rhinoceros, and other animals now extinct had lived in these latitudes was amply proved, but the indications of man's existence were little observed because they were not expected; and when they did occur, the evidence was disregarded even by scientific men of the first rank. There can indeed be little doubt that in these investigations much evidence for the co-existence of man was unwittingly destroyed.

The Gailenreuth caves in Franconia were explored in 1774 and 1820, and the co-existence of man and the extinct animals ascertained; but the discoveries by Dr. Schmerling in the caves of Liège about 1832 perhaps did more than any others on the Continent to draw the attention of the scientific world to these momentous facts. In the forty caves examined, he met with very few human bones, but a large number of flint implements and flakes which were rightly attributed by him to human agency; and since his day many scientific investigators have accumulated evidence from a great number of sites, ranging from Gibraltar and Sicily to Switzerland and Brittany. It is, however, in France that the most important and interesting explorations have been conducted, and a representative collection excavated in the caverns of the Dordogne by Mr. Henry Christy and M. Edouard Lartet is exhibited in the iron gallery round the Prehistoric Room.

The cavern abodes of palaeolithic man are all of natural forma-

tion, but may be arranged in classes according to their geological history. The majority consist of recesses in limestone rock either produced by the erosive action of a river which has created a valley outside the entrance, or by subterranean streams that have found their way to the river through natural fissures in the rock, or have themselves formed a passage by the action of the carbonic acid contained in rain-water. In some cases the lowest beds of a cliff are wasted horizontally by water and frost, and leave behind a kind of pent-house that would afford shelter to a primitive population. In other cases deeper and isolated recesses are formed by the same means, but still consist of a single chamber with a comparatively large opening, while the action of subterranean streams due to drainage from a higher level generally produces long winding galleries that radiate in several directions and on different levels. This last is the most common form of cave dwelling in this country, but examples of all kinds are found in France and other parts of western Europe.

Caverns of palaeolithic date are to a large extent filled up with silt deposited either by drainage from above or by floods in the valley, on the slopes of which they are often found. The formation of stalactite (from above) and stalagmite (from below) is familiar; and it is by this means that the accumulations introduced by man and beast during successive ages have extended our knowledge of those remote times. Once the entrances were blocked, the bone-caves became practically inaccessible, and the floor was preserved from disturbance during the formation of the breccia which in many cases has sealed up the early deposits till recent times.

The culture following that of Le Moustier had some resemblance to it but was of different origin, and introduced by a superior race from North Africa, where Le Moustier types had also penetrated. The new industry, which accompanied man's first artistic productions, is now known as Capsian (after the Latin name of Gafsa in Tunis, Capsa) and had apparently been established for some time in Spain before skirting the Pyrenees and spreading into France and Britain, where it is named after Aurignac (a cave in the Haute Garonne, 40 miles SW. of Toulouse explored by Lartet and published in 1861), and assumes many local facies. It covered most of western and central Europe, and there seems to have been another centre of dispersion at the other end of the Mediterranean in Syria (p. 176), and again in Italy; but its further evolution took different courses in Europe and the Mediterranean (p. 165). In the latter area it merged into that of Mas d'Azil, whereas farther north there were certain intermediate stages now to be considered.

The culture next in chronological order is that of Solutré, an open-air 'station' in Saône-et-Loire (p. 131); and it probably originated in eastern Europe, being confined to a comparatively small area in France and northern Spain, and barely represented in

Britain. From Hungary it spread into Poland and Moravia, and up the Danube to Austria and southern Germany, also along the Atlantic and Mediterranean coasts into northern Spain, but is unknown in Italy and other Mediterranean regions. Apart from their fine flint blades the Solutré people have left little trace of artistic ability in France, though ivory statuettes have been found at Brünn (now called Brno) and Předmost in Moravia.

This alien intrusion was followed in western Europe by the industry of La Madeleine (a rock-shelter near Les Eyzies in the Dordogne), which had almost the same distribution as Solutré but proceeded from the West eastward in Europe. Outside France it is well represented in Switzerland and Germany, but so far poorly in Britain and not at all in Italy. The period is marked by a falling-off in the craft of flint-working, but by a splendid development of graphic and plastic art, the last burst of naturalism before the dark ages of the Neolithic. There is a good deal to be said for Piette's contention that art began in the round, went on to low relief and ended in line-drawing, though the three main divisions are not rigidly exclusive. Masterpieces of the Aurignac period were principally female statuettes carved in ivory: La Madeleine man excelled in the portrayal of animals in line or colour, and the gradual decay of his talent gave rise to what is known as the stylization of the human or animal form —its gradual conversion into symbols and something akin to alphabetic signs (p. 146). The climate which had been less severe in the two preceding periods now rivalled that of Le Moustier, and many authorities identify this change with the minor Bühl advance of the glaciers, calling it post-glacial.

As human anatomical remains are not exhibited here but at the British Museum of Natural History, only a brief summary need be given of the skeletons or fossil bones of man, which have rapidly increased in number since close attention was given to the subject. The earliest specimen of all, if the account of its discovery in 1855, 16 feet deep in the Red Crag pit at Foxhall near Ipswich, is to be trusted, was inadequately illustrated before it was lost; and its recovery would be an event of supreme importance. Its date would be well in the Tertiary period, and Mr. Reid Moir's discoveries below the Crag have led many to extend the human period considerably, so that East Anglia is now recognized as the locality most likely to yield the earliest human bones and so put an end to the eolithic controversy. With the enormous lower jaw found below 80 feet of stratified deposits in a sand-pit at Mauer near Heidelberg in 1907 begins the Neanderthal series, which is now known to have persisted till the end of Le Moustier. In the early stages there were more discrepancies than later, and the famous skull in the Natural History Museum from Piltdown, Sussex, is one of those which is

only distantly related to the Neanderthal type: another anomaly in the same collection is the compressed skull from the high terrace at Galley Hill (adjoining Swanscombe, Kent), which is quite distinct and approaches the modern type. On the other hand the Gibraltar skull in the Museum of the Royal College of Surgeons is easily recognizable as of Neanderthal type, which has many primitive characteristics. The typical skull is large and low, sharply rounded at the back, and the forehead flat and receding, with a heavy continuous brow-ridge above eye-sockets that are almost circular. The face is prognathous (with projecting jaws), but the lower jaw, though massive, has either a rudimentary chin or none at all; and the cephalic index (proportion of breadth to length expressed as a percentage) ranges from 68·2 (La Quina) to 77·9 (Gibraltar), most of them being dolichocephalic (long-headed). The brain was entirely human, though without the finer convolutions of modern man, and the average stature only 160 cm. (63 in.). It is now believed that Neanderthal man was distinct from even the most primitive of the known races of mankind, and he apparently became extinct in Europe before the period of Aurignac, which is marked by a new racial type, named after Cro-Magnon (pp. 129, 130). Most of this series closely resemble the modern European, with the skull long or moderately broad, the forehead well developed, and the whole skull high and well rounded. The cranial capacity is excessive, reaching about 1600 ccm. (97·64 cubic in.), whereas that of Neanderthal man is estimated between 1260 (Gibraltar) and 1532 ccm. (Neanderthal). The face is short, broad, and flat, and the brow ridges cover only the inner half of the orbit. The lower jaw is stout and furnished with a chin; and though the skulls show great similarity, the stature varies considerably (about 157·5 cm. or 62 in. to 187 cm. or 73½ in. for the males). The short-headed (brachycephalic) type (p. 97) is well represented among the skulls buried at Ofnet in Bavaria, but has recently been found in the lower (Aurignac) level at Solutré (p. 132).

According to some authorities the palaeolithic period came to an end with La Madeleine, the mammoth disappearing from France early in that stage but lasting till the end of it in Belgium. The term Mesolithic has been suggested to denote all the industries between La Madeleine and the general use of polished stone implements in the last phase of the Stone Age which is known in Scandinavia as the Megalithic period, where large stones were used for monumental purposes. But even then polishing was not the exclusive practice, and had long before been applied to rocks other than flint to procure a cutting-edge. Another name for a portion of this intermediate period is Epipalaeolithic (meaning that which comes after the palaeolithic), covering the periods named after Mas d'Azil, Tardenois, and Maglemose. These stages

continue the story of European culture, but are at present hardly represented in this Museum.

Mas d'Azil (Ariège, p. 145) marks the further degradation of flint-working, though considerable skill was necessary to fashion the pygmy implements or microliths that now became typical. These assume certain geometric forms (figs. 84, 214) with the thicker edge battered (*à dos abattu*), and are accompanied by diminutive disks of flint (sometimes called thumb-scrapers), flat and perforated harpoons of deer-antler, and pebbles painted with symbols of different kinds—altogether a pale reflection of La Madeleine with its eastern limit at Ofnet in Bavaria. About the same time the Capsian culture of Spain was turning into the Tardenois phase (well represented at La Fère-en-Tardenois, Aisne), and the two systems seem to have overlapped in western Europe. They spread, more or less in combination, north and east, and there is more of the Tardenois than of the Mas d'Azil element in the culture named after Maglemose (the great moss) in the Danish island of Zealand. Dr. Sarauw's researches have provided a geological date for this stage, by associating it with the Ancylus period, when the Baltic area was a fresh-water lake owing to land elevation, with *Ancylus fluviatilis* (the river limpet) as the characteristic mollusc (see table, p. xiv). The date of Maglemose is generally considered to be 7000–5000 B.C., and its predominant tree was the pine, whereas in the succeeding Shell-mound (formerly called the Kitchen-midden) period of Denmark the oak flourished between 5000 and 4000 B.C. By this time the land of southern Scandinavia had sunk, the salt water had broken into the Baltic, and the characteristic mollusc, which had given its name to the subsidence, was the *Littorina littorea* (the periwinkle) on the Swedish and German coasts, while *Tapes decussatus* predominated in Denmark, West Sweden, and Norway. A general improvement in the climate of this period was due to changes of direction in the warm ocean currents, and the climatic optimum of post-glacial time did not extend to the inland regions of Europe.

The Shell-mound culture and its counterpart named after Le Campigny (twenty-five miles east of Dieppe) have been called proto-neolithic—signalling the approach of the New Stone Age; but if Epipalaeolithic is retained, this term is hardly necessary, and for many years the Neolithic has been held to begin with the Shell-mounds, though locally these constitute the Older Stone Age of Scandinavia. But on the whole the early Neolithic, before the general use of polished flint, is a nebulous period, beginning perhaps 10000 B.C. in western Europe, where copper made its first appearance about 2500 B.C., and the Stone Age gave way to the Aeneolithic period, when stone and metal were in use together.

DESCRIPTION OF EXHIBITS

Apart from those retained by the Natural History Museum, the flint and other specimens illustrating the Stone Age of the British Isles are exhibited in the south bay of the Central Saloon at the head of the main staircase. Owing to the lack of space in the Wall-cases (61–78) and Table-cases (R, S, T), many of the smaller series both from Britain and abroad are mounted on tablets in glass-topped drawers, accessible to the public, below the Table-cases. Printed labels in front of each drawer give the localities and brief descriptions of the contents; and though their arrangement is subject to alteration, Drift specimens from Britain may be found below Cases R and S on the south side (next the Wall-cases), and foreign groups on the north side of the same Cases, while Cave-period and neolithic specimens from Britain fill the drawers under Case T, opposite the entrance to the Terracotta Room. The chronology follows for the most part the numerical order of the Wall-cases, beginning at no. 61; and in 62 is included a small exhibit of bones and teeth belonging to fossil animals mostly contemporary with palaeolithic man. The lower jaw of a young mammoth was dredged off the Suffolk coast, and belongs to the period when the North Sea did not exist. A molar and part of a tusk of the mammoth are also shown, the latter found with flint implements at Bedford. The earlier form of elephant (*antiquus*, also called 'straight-tusked'), a survival from the Tertiary period, is represented by a molar and the tip of a tusk, both from Little Thurrock, Essex. *Elephas meridionalis* is a Tertiary species.

In a box (Case 63) are exhibited some interesting relics, showing the co-existence of man and the mammoth: a shoulder blade of the latter was found, as here arranged, on the palaeolithic level at Lower Clapton, with a well formed flint implement resting on it. At the back are two artificially-pointed stakes of birch from a site on Stoke Newington Common (p. 43); and above are two massive blocks of flint probably used by palaeolithic man as anvils in the manufacture of implements: one of them is 2 ft. in length, weighs thirty-two pounds, and was found near Isleworth.

A coloured map (Case 62) shows the extent of land in north-west Europe during some part of the palaeolithic period, when the 100-fathom line marked the eastern shore of the Atlantic and neither the

North Sea nor the English Channel existed. A table of stratified rocks is also exhibited here, but it is mainly from the Quaternary (Pleistocene and recent) beds that the present collection is derived. The red line marks the geological period of man's first appearance, according to the views most widely accepted. In the same Case, however, is a series of chipped flints on which have been based arguments to show that a very much earlier date must be assigned to the human race, and in the light of recent discoveries the line might be placed lower, some authorities regarding the presence of man as proved in the Pliocene, Miocene, and even Oligocene periods.

The significance of these flints has been the subject of controversy, for though their Tertiary age is generally conceded, it has been urged that the apparently intentional chipping has been produced by purely natural agencies. Such flints, to which the name of Eoliths has been given, have been found in considerable numbers in various parts of the South of England, notably on the Kent plateau in the neighbourhood of Ightham. Whether the claims of any particular specimens to be of human workmanship can be substantiated or not, the existence of implements of a ruder kind than those of the Drift is in itself not improbable. For no invention reaches perfection suddenly, and each stage of advance is attained by slow progress from the simple to the more complex. The majority of the Drift implements are clearly something more than the first efforts of an unpractised hand; they show signs of a comparatively long development, and it may be fairly argued that their ruder prototypes must exist somewhere. It was only to be expected that they should have escaped notice for a longer time than the typical palaeoliths, if only because they must bear a closer resemblance to naturally fractured flints. We may draw similar conclusions from a consideration of the stone implements of the most primitive savage tribes. The knives of the now extinct Tasmanian aborigines were of the rudest description (Case 118), generally chipped only on one side, and quite devoid of symmetry. The Andamanese had implements of a yet more elementary kind, and the Semang, a similar Negrito tribe of the Malay Peninsula, are said to have stone implements only in the sense that they pick up and use such convenient fragments as they may chance to find, usually employing shell, bamboo, or wood to provide for their simple needs. There are, therefore, still in existence peoples to whom, for climatic and other reasons, stone implements are of only secondary importance; and, though their civilization is low, it must be higher than that of the earliest representatives of the human race. If, however, the Negrito tribes had died out before their countries had been discovered by Europeans, the extremely rough character of their stone tools would probably have led anthropologists to reject their claims

to human origin. The extreme rudeness of a chipped flint is not in itself a ground for its rejection as the work of man.

Though the question of Tertiary man had then been long under discussion on the Continent, the campaign was opened in Britain by Prof. Prestwich's papers of 1889 91 on the eoliths collected by Mr. Benjamin Harrison of Ightham on the North Downs near his home. Agreement has by no means been reached as to the human origin of such forms as fig. 12, *a–e*, but several look anything but natural; a few can hardly be rejected, and the discovery of any such good specimens in a gravel that must be of extreme antiquity ought to decide the issue.

On the summit of the chalk downs of south-east England occur patches of Drift-gravel (fig. 11) that must have been carried by natural agencies from higher ground in the neighbourhood, and

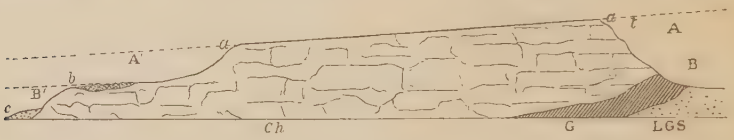


Fig. 11.—Section of North Downs, showing relative positions of plateau and river drift.

a. Red clay drift, 5-20 ft. thick, with unrolled flints from Chalk, overlying thin patches of lower Eocene and Pliocene beds. On the surface are found eoliths, and fragments of chert and ragstone from the Lower Greensand outcrop. *t*. Position of Pliocene beds. *b*. High-level river-gravel about 100 ft. above the Thames. *c*. Low-level river-gravel and loam, sloping down to the Thames. *Ch*. Chalk. G. Upper Greensand and Gault. LGS. Lower Greensand. AA'. Major valleys of glacial period. BB'. Later valleys.

this can only have been done before the Weald district had been denuded below the level of the North and South Downs. The inclination of the beds, as shown by the diagram in the Case, is sufficient evidence that the chalk was elevated high above the present surface of the Weald clay, the beds having since been denuded to the following respective depths: Chalk, 1000 ft.; Upper Greensand, 80 ft.: Gault, 100 ft.; Lower Greensand, 600 ft.; and (where the Hastings Sand comes to the surface) Weald Clay, 750 ft. It was during this process that chert from the outcrop of the Lower Greensand was washed down on to the present plateau, where rolled pebbles of that formation are now found in the gravel along with eolithic flints: and as the summit of the chalk downs is now about 800 ft. above the sea, it is evident that these gravel deposits date back to a very remote period, when rivers flowed north and south from the watershed high above their present level. The eolithic flints of the North Downs seem to be closely associated with the Plateau gravel and to be confined to the area over which it extends; while their rude workmanship accords well with the

early date assigned to them. The original specimens figured by Sir Joseph Prestwich in *Controverted Questions of Geology* were presented, with a large number of ordinary Drift implements, by his widow to the Natural History Museum,* where some are exhibited in the Department of Geology and Palaeontology. Those selected for illustration (Case 61) came from the collection of the late Mr. de Barri Crawshay, who wrote on the subject as

Fig. 12.—Eoliths from the North Downs, Kent.

early as 1892, in conjunction with Mr. Benjamin Harrison. The most symmetrical is fig. 12, *b*, with original crust on the upper face and a natural fracture below : a blunter point flanked by notches is seen in fig. 12. *e*, the crust having white spider-markings (as pl. II, no. 4), and the same method was adopted in fig. 12, *d* and *a*, but these are made from struck flakes, the second point of the latter being formed out of a large bulb of percussion. The remaining example (fig. 12, *c*) is chipped nearly all round, and has a squared end between two notches. All are ochreous, but not always of the same shade. Some of the forms here exhibited present a certain resemblance to the ordinary river-drift type, but

in 1904 Mr. Harrison expressly stated that palaeoliths and eoliths had been found together only on the surface, and never in the drifts *in situ*. Several excavations resulting in numerous discoveries of eoliths at varying depths have been made in recent years, and the late Mr. F. J. Bennett stated that all periods are represented in the surface drift, below which is a bed 3 ft. thick with eoliths and palaeoliths only; and at 8 ft. from the surface a consolidated gravel ('pan'), containing eoliths as the only type attributable to man. It should be noticed that some of the palaeoliths from the same area in Case 62 are as deeply patinated as the eoliths, though they are by no means rudimentary in type.

Though the North Downs of Kent must be regarded as the classical site for eoliths, several other localities in England are known to have produced flints of eolithic character. A few on exhibition were found by Rev. H. G. O. Kendall in Herts. and Wilts., one site in the latter county being the summit of Hackpen Hill (875 ft.). An instructive series is exhibited in Salisbury Museum; many have been found in that neighbourhood, and others near Eastbourne, Sussex; in Hampshire, in southern Essex, in the Berkshire hill-gravels, as well as at Lenham, Canterbury, and West Wickham in Kent.

If eoliths are given the benefit of the doubt, their ochreous staining, their primitive flaking, and geological horizon all combine to class them as the first recognizable work of man, at least in Britain, where there is no question of Miocene man as in France (p. 118); and further indication of their antiquity is given by Mr. Reid Moir's discovery in 1909 of flints, regarded by several authorities as of human origin, below the Crag of Suffolk (table on p. xiv). These confirm the late Mr. W. G. Clarke's finds below the Norwich Crag four years previously, and the sub-Crag specimens normally have various shades of brown on the surface, sometimes with a purplish tinge. Sir Ray Lankester, who named the leading type of this series 'rostro-carinate', assigns the Red and Norwich Crags to the Pleistocene (not to the Pliocene as usual); but however classified, both these Crag deposits testify to a cold climate and precede the Cromer Forest-bed, which was laid down in a warm climate and is generally regarded as the link between Pliocene and Pleistocene, as it was immediately followed by one of the major glaciations of the Ice Age. The leading type, which is thought to resemble an eagle's beak, is found with others mostly in the basement bed of the Red Crag, that is, on an old land surface subsequently covered by the Crag sea and buried under its shelly deposits: hence any flints worked by man that are found in the detritus must be older (and may be very much older) than the Red Crag. Mr. Reid Moir, however, contends that the eoliths of Kent (though represented below the Crag) are still more ancient, as

the rostro-carinate type shows an advance in technique, and distinctly points forward to the hand-axe of Pleistocene times, which he claims to be directly descended from the leading sub-Crag type. This, unlike the Kentish eoliths which are made of tabular flint, was chipped out of large nodules, and the enormous size of some East Anglian specimens, implying great strength as well as ability in their makers, is a leading feature of this industry, which, however, includes smaller specimens generally with lustrous and creamy surface and of irregular shapes, like those from the 16 ft. level at Foxhall, and below the Shelly Crag at Thorington Hall, near Ipswich (Case 61).

Remnants of the original striking-platforms, usually flat and

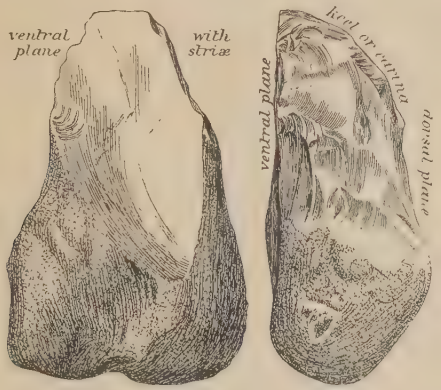


Fig. 13.—Rostro-carinate flint, Ipswich. (⅓)

parallel, are known as the dorsal and ventral planes, and the final blows along the edges of the latter removed flakes which left a keel (*carina*) sometimes curved like an eagle's beak, which would have been the cutting-edge of the implement (fig. 13). Flaking from the lower edges in the opposite direction would tend to produce a lozenge (instead of the original triangular) section, and thus may have begun the evolution of the hand-axe. This was a pointed implement sharpened on the side-edges near the point and furnished with a heavy butt for holding, generally retaining some of the original crust of the flint. The two main surfaces of the flint are best called 'faces' to distinguish them from the 'sides', which are generally sharp near the point and may be zigzag or even, straight or curved; and are occasionally interrupted by a striking-platform not eliminated in finishing the implement. A typical specimen (fig. 56) shows bold and skilful flaking of the two faces by blows delivered on the edges, and alternate flaking on the sides, resulting in zigzag or wavy edges

for cutting or chopping. Men of the Chelles period seldom indulged in small surface-flaking or symmetrical edge-trimming; and their hand-axes can generally be recognized by the large flaking, zigzag sides, and heavy crusted butt; but it must be remembered that heavy flakes were also used occasionally (as in the lowest gravels of the 100-ft. terrace at Swanscombe), and the hand-axe was not the only pattern of implements made from the core (p. 44). Flints were required for the elementary purposes of striking, scraping, planing, sawing, and boring, but for these processes flakes would be more useful than core-implements, and plenty of flakes, as well as the cores from which they were struck, have been found in the high-terrace gravels. Along with core-imple-

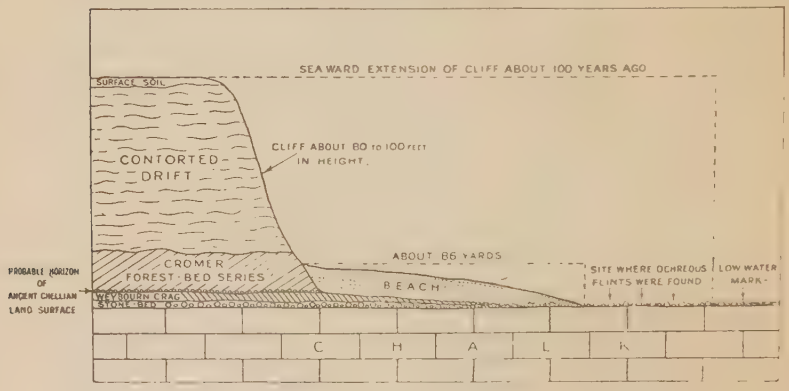

SEAWARD EXTENSION OF CLIFF ABOUT 100 YEARS AGO
SURFACE SOIL
CONTORTED DRIFT
CLIFF ABOUT 80 to 100 FEET IN HEIGHT.
ABOUT 86 YARDS
CROMER FOREST-BED SERIES
BEACH
SITE WHERE OCHREOUS FLINTS WERE FOUND
LOW WATER MARK
PROBABLE HORIZON OF ANCIENT CHELLIAN LAND SURFACE
WEYBOURN CRAG
STONE BED
C H A L K

Fig. 14.—Sectional diagram of cliff at Cromer, Norfolk.

ments flakes may therefore be expected in early Drift times, but their size and colour on the beach at Cromer, Norfolk, are altogether exceptional, and their abundance is due to the exposure of an ancient workshop-site. From time to time worked flints have been found in the Forest-bed deposits of the cliff by Mr. Lewis Abbott and others, but Mr. Reid Moir was the first to draw attention to a deposit on the fore-shore apparently belonging to a period before the cliff was formed, as indicated in fig. 14. Hundreds have now been collected from the beach, and nearly all are flakes of deep ochreous patination or lustrous blue-black, many being of massive proportions and suitable for use as choppers. The older specimens of this group, owing to prolonged exposure, assumed a white surface (patina), which would absorb the ochreous stain, whereas the later ones were covered up as soon as they had turned blue, and the surface, remaining fairly hard, has undergone little discoloration. The sequence is proved by ochreous specimens which are blue where re-chipped. A type series is

displayed in the lower part of Case 61, and a few hand-axes referable to the same horizon have been found, with the same peculiar coloration. The theory is that all belong to an early culture that may be called pre-Chelles, and were made by people living on the eroded surface of the Weybourne Crag just after the Günz glaciation which that deposit indicates in the Pliocene. The raw material was readily procured from the sub-Crag stone-bed which was then exposed on the spot; and it should be pointed out that the site of this discovery was still covered by the cliff within the last century, and there is a prospect of finding more *in situ* as the coast-line recedes. The leading implement, however, continued to be made from the core during St. Acheul times, when certain changes are noticeable which are useful for dating stray specimens. Even in Chelles time there was an ovate implement (called in French *limande* from its resemblance to the dab-fish or 'lemon' sole), and the type was gradually refined in the following period. The flaking of the faces was more careful, and the facets (or flake-beds) reduced in size: the sides (edges) became more even, either in a straight line, or in a double curve, like the letter S but much more often reversed (Ƨ). Any attempt to explain the curved edge as the inevitable result of chipping with the right hand (the exceptional S being due to left-handedness) is ruled out by the frequent occurrence of straight sides, which in many cases pass round the butt to form a continuous cutting-edge. The point is often transformed into a sloping chisel-end (as fig. 46), called in French *biseau*, which may be translated by the cognate word 'basil', a current term in carpentry. The usual forms are pointed ovate, almond-shaped (amygdaloid), and circular or triangular, changes of fashion being of chronological importance. Though implements of Chelles type are fairly common in Britain, they have rarely been found *in situ*, and many of the specimens from the middle gravel of the 100-ft. terrace at Swanscombe are now regarded as St. Acheul forms. Perhaps the best authenticated are those from the lowest level of Kent's Cavern (p. 71) and from the gravel at Stony Cross, almost at the summit of the New Forest (p. 64). Several from the edge of the plateau or a very high terrace (120 ft.) above Fordwich, Kent, are on the left of Case 65, and (as might be expected) irregular in form and rough in execution.

A clue to the date of the earliest deposits on the chalk-shelf known as the 100-ft. or Boyn Hill terrace of the Thames was discovered at Ingress Vale, Greenhithe, though systematic excavation was undertaken too late to determine the sequence of events. The site is represented in this collection only by flakes (drawer in Case R), which agree with those at the same height above the river (base of deposits about 83 ft. O.D.) in Barnfield pit opposite (p. 29); but the Greenhithe Shell-bed, which consists of about 6 ft.

of gravel (fig. 15), swarms with *Unio* shells and especially *Neritina Grateloupiana* which, taken in conjunction with mammals from the pit (including the giant beaver, *Trogontherium Cuvieri*), indicates a warm climate and a very early Pleistocene or even a Pliocene date. Several observers state that St. Acheul implements, including fine twisted ovates, have occurred in the Shell-bed; but these are difficult to reconcile with the conditions seen during official excavations in 1913, and probably belonged to an upper bed en-

Fig. 15.—Section of shell-bed, Ingress Vale, Greenhithe.

tirely destroyed by that date. About 1900 the Pleistocene deposits, including the Shell-bed, are said to have been exposed to a depth of 14 ft. The largest collection from the site, numbering over 200 specimens, is in the National Museum of Wales at Cardiff, but most of the ovate and cordate implements are in private hands.

Though flint implements had been obtained from the gravel-diggers at Swanscombe, midway between Dartford and Gravesend, as early as 1883 (H. Lewis), their horizons in the Pleistocene deposits of the 100-ft. terrace were not investigated till 1912, when excavations with this end in view were undertaken by this Museum and the Geological Survey. The chalk, which is quarried for the manufacture of cement, here forms (with the Thanet Sand) a shelf about 65 ft. above Ordnance Datum, and is covered with a maximum of 35 ft. of sands, gravels, and loams (fig. 16), which have proved wonderfully rich in palaeolithic implements. The 6 ft. of lower gravel was yellow, white, and red in descending

order, and yielded nothing during the excavation but rough and heavy flakes, the archaeological horizon being fixed by a tusk of *Elephas antiquus*, the elephant that preceded the mammoth and enjoyed a mild climate. Of the 200 flakes recovered most came from the coarse red layer above the Thanet Sand. Next above was the lower loam, 3–4 ft. thick, which only contained some mollusc shells, but served to divide the Lower from the

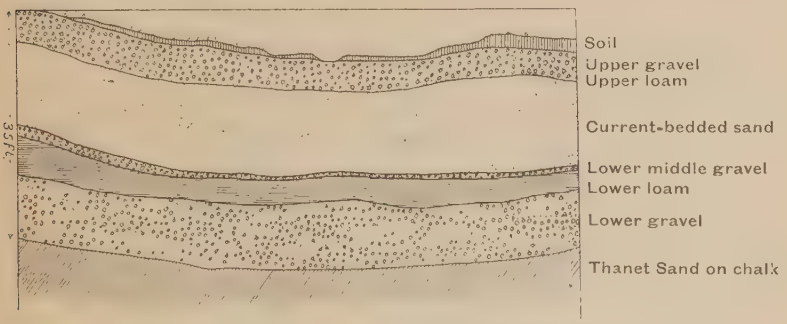


Fig. 16.—Section in Barnfield pit, Swanscombe.

Fig. 17.—Pear-shaped implement, Barnfield pit. $(\frac{2}{3})$

Middle Gravel, which proved the most prolific bed on the site. It had an average thickness of 13 ft. and was replaced in part of the pit by current-bedded sand on a continuous gravel base, from which came most of the series on exhibition. As a deposit is dated by its latest implement, the Middle Gravel must be assigned to the period of St. Acheul, though the late Chelles period may be represented by unrolled specimens, not derived from earlier deposits in the neighbourhood. The most common type is small and pear-shaped (fig. 17), and though the official excavation did

not disclose the industries of the uppermost beds at Barnfield pit, many typical St. Acheul ovates with white patina (as fig. 18) have been found at the base of the Upper Loam and in the adjoining pit close to Craylands Lane, due south of the famous

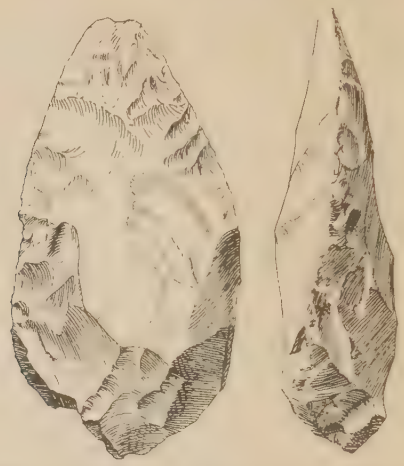


Fig. 18.—White implement with curved side, Barnfield pit. $\frac{1}{2}$

Fig. 19.—Spindle-shaped implement, Milton Street, Swanscombe. $(\frac{1}{3})$

Galley Hill (p. 18). An exceptional implement of spindle-form (fig. 19) was found 6 ft. from the surface in gravel close to Barnfield pit. The terrace-deposits of this district (formerly known as Milton Street) were laid down over a long period, the land slowly sinking beneath a river which at one time brought down large washes of gravel and at another the finest mud and sand. At the Globe pit, Greenhithe (where brick-earth has yielded many late

Drift implements of creamy patina), and at Northfleet east of Swanscombe there was no slow accumulation, but sudden and powerful rushes of water sweeping before them every obstacle on the hill-sides and dropping their burden as the speed slackened.

The significance of patina is well illustrated by a Swanscombe specimen in Case 65, found and presented by Mr. M. H. Heys. It came from the high terrace and was high up in the gravel, where it may have been above the St. Acheul level (p. 29), though it has been regarded as a much earlier specimen, of the Hill type (generally small, ochreous, and twisted hand-axes, connected with the plateau deposits). If it was swept down from the high ground south of Swanscombe, where it had acquired its early ochreous colour, the plateau must then have been continuous with the south bank of the Thames, from which it is now separated by a valley. The ochreous specimen from Caddington, which was found re-chipped in the brick-earth, is a parallel case (p. 48).

The Dartford Heath gravel, 4 miles to the west of Swanscombe, reaches a height of 136 ft. O.D. and was formerly regarded as a separate terrace, but is now generally linked with the 100-ft. deposits of the Thames, and a few palaeoliths have been found in it. One of the very few implements known to have been found in the gravel on the Heath was 8 ft. deep (Case 65) and is a pointed oval, with one edge straight and the others slightly S-curved: on both faces are blue-white markings on a blackish ground (pl. II, no. 2), and the surface is unusually lustrous, with no sign of rolling. On its northern edge at Wansunt enormous excavations have been made for gravel, which is upwards of 40 ft. thick, and rests on the Thanet Sand at 90–100 ft. O.D. A later deposit consisted of brick-earth in a broad channel running parallel to the Thames but about 100 ft. above it; and various cordate implements as well as flakes have come from it. Three here exhibited (two in fig. 20) were found during an official excavation in 1913, and may be referred to the period of Le Moustier, whatever the explanation of their presence on this horizon. Apart from a few derived implements, all from the channel are sharp and unstained, some showing spots or streaks of iron and manganese oxides, others with white spots and incipient patination, and a few with patches of gloss (p. 59). At least one 'nest' of flakes, which could be fitted together again, showed that the clay was deposited under tranquil conditions.

On the 50-ft. terrace of the Thames at Southfleet pit (formerly Baker's Hole), Northfleet, a torrent of sludge from the chalk hills, due to the melting and slipping of the frozen soil, overwhelmed a settlement and flint-factory usually assigned to the period of Le Moustier but now classed by some as St. Acheul II. Tusks, bones, and teeth of the mammoth (*Elephas primigenius*) were deposited in tumbled masses of clay, sand, and chalk to

which the name of Coombe-rock has been given. It is so called because it is often found in the coombes or dry valleys of the Downs, and the Black Rock east of Brighton is a good exposure of this glacial deposit. The 50-ft. or Taplow terrace had already been cut, owing to elevation of the land since the 100-ft. terrace was covered ; and the fauna and industry combine to fix the date of the Northfleet deposit.

The industry represented by the implements and flakes covered

Fig. 20.—Two implements from brick-earth, Wansunt, Crayford. (⅔)

by the Coombe-rock closely corresponds to that of Montières, near St. Acheul in the Somme valley (p. 124), and may be described here in continuation of the Swanscombe series, the whole giving a typical sequence for the lower Thames valley. Whatever be the exact stage represented, it is clear that the Northfleet industry utilized flakes, as opposed to the core-implements of the Drift ; and the flakes were obtained in a peculiar way, in order to produce an ovate hand-axe with half the usual labour. On account of its greater resistance, a large lump of flint is easier to flake than a small one, and the method at this period was to shape a lump into the form of a tortoise (hence called a tortoise-core). The

more conical face, corresponding to the back of the tortoise, was the under-side of the core, and crust was often left on the apex as this face was chipped only on the border to provide a level and symmetrical outline for the flatter or upper face, which was a low dome formed by detaching flakes by blows on the edge (fig. 21). At one end vertical dressing formed facets near the point where the final blow was delivered to detach the flake-implement (fig. 22), which if successful had a plain bulbar face and a facetted butt, but

Fig. 21.—Struck 'tortoise'-core, with end view, Northfleet. ($\frac{1}{3}$)

sometimes the flake came off short, or plunged into the core (fig. 23). A margin of flake-scars was generally left on the core, which was then abandoned. Dozens of these struck-cores were found at Northfleet as at Montières, and there is a considerable variation in their sizes, those on exhibition ranging from $3\frac{1}{2}$ in. to $7\frac{1}{2}$ in. in length. The method was certainly extravagant (implying that the supply of flint from a neighbouring chalk-pit was abundant), but the advantage was that one of the faces was produced by a single blow, unlike the laborious technique of St. Acheul ovates. This type of implement can be easily recognized and is much more commonly found than the cores, and in a variety of patinations. Some are quite fresh, either black or grey, others

have the 'basket' patina (p. 45); one from Reculver (Case S) has rich brown and creamy tints, and they are generally unrolled.

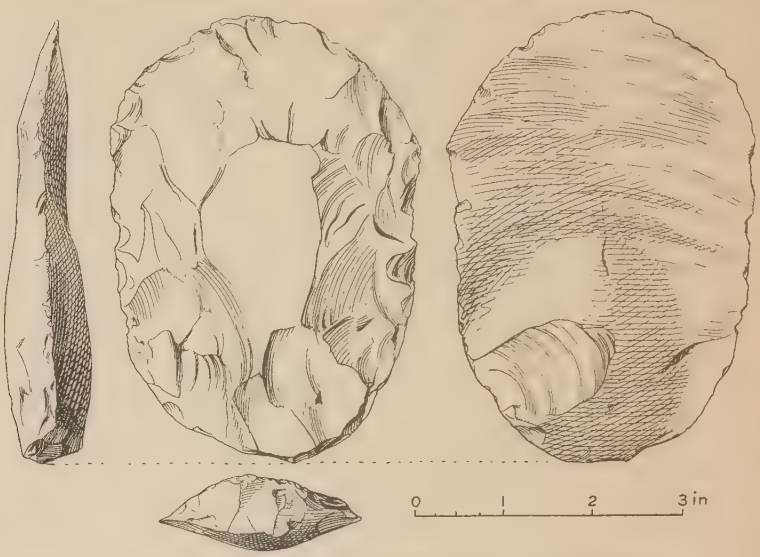


Fig. 22.—Flake-implement from 'tortoise'-core, Northfleet.

Fig. 23.—Plunging-flake from 'tortoise'-core, Northfleet. (⅓)

How long the fashion lasted is uncertain: many examples from St. Brelade Cave (p. 125) are evidently contemporary with the mammoth; there are clear traces of the type at Grime's Graves

(p. 83), and many cores from Suffolk, both from the surface and below, are unmistakable 'tortoises', in miniature, called (like the larger specimens) 'disk-cores' by Continental archaeologists, the flake-implements being named after Levallois (p. 124).

A link with the famous and important finds at Crayford, on the same bank of the Thames above Dartford, is afforded by the discovery of a few flake-implements of Northfleet type in the brick-earth, presented and published by Mr. Brice Higgins. They were found at 30–40 ft. O.D. and are evidently scarce in the brick-earth: some are brown, but most are white or mottled blue and white, showing incomplete patination. Crayford is, however, best known for the sharp, black and lustreless flakes found in contact with the jaw of a woolly rhinoceros (*tichorhinus*) on the palaeolithic floor or occupation-level discovered by Mr. F. C. J. Spurrell in 1880 at a depth of 36 ft. on an old bank of the Thames (or sandy talus), two miles from the present river and in front of a chalk cliff against which successive floods had deposited layers of brick-earth and sand. These flints are in the Natural History Museum with a number of flakes now fitted together to show the original form of the nodule from which a palaeolithic implement was produced. Three flakes from the site are here exhibited (Case 69), two of them belonging together and in unchanged condition.

The fauna of the brick-earth includes the lion, wolf, rhinoceros, horse, and urus (*Bos primigenius*), also the small mollusc called *Corbicula fluminalis* (formerly *Cyrena consobrina*) which is abundant in a zone of yellow sand and pebbles dividing the upper or clayey brick-earth from the lower or sandy brick-earth of the locality; but it is said to occur throughout the Pleistocene in the Thames-Rhine system of Britain, and is therefore a poor zone-fossil. A piece of fossil antler from Little Thurrock, Essex (Case 64), appears to have been cut with a flint implement, and bears an impression of this shell, which was found in abundance on a corresponding floor north of the Thames.

Though the Crayford brick-earth is generally considered on account of its fossils to belong to the middle terrace, the chalk shelf on which it rests is about Ordnance Datum (mean sea-level at Liverpool), and was covered first with a bed of gravel 10–25 ft. thick, on which the brick-earth rises 30 or 40 ft. The flint implements, chiefly from the lower brick-earth, are mostly found *in situ* (not derived from higher levels), and belong to the Le Moustier series, no St. Acheul specimens being known. The glacial deposit called Trail is seen on the brick-earth slope, and is known to pass below the submerged forest of Essex on the opposite shore of the Thames estuary.

The current view is that many changes have taken place in the lower Thames valley since the middle (Taplow or 50-ft.) terrace

was formed, as a shelf in the chalk, before the end of St. Acheul times. The waters were ponded back, perhaps by a barrier of ice, with the result that a great thickness of brick-earth was deposited at Crayford on the workshop-site; next the land rose and the river cut down to the third or lower terrace, after which a further rise caused the sunk-channel to be cut to a depth of 80 ft., this being gradually silted up by the return of the land to about its present level. These events emphasize the antiquity of the Drift series of implements, and are represented in fig. 10.

A famous locality is the sea-shore between Herne Bay and Reculver, where implements are often found at the foot of the cliff which have dropped from the gravels at the summit overlying the Tertiary beds. They are more or less water-worn, according to the time they have been exposed to the action of the waves. One

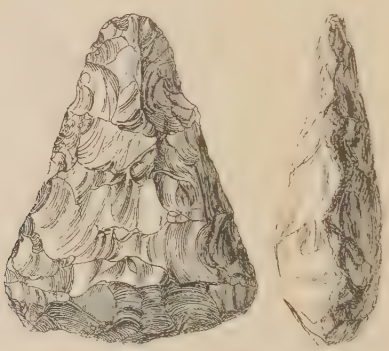


Fig. 24.—Triangular hand-axe, Herne Bay. ($\frac{1}{3}$)

from Herne Bay, triangular in form, is here figured (fig. 24) and would now be assigned to Le Moustier, like those from Coussay-les-Bois (Case 104); and it is significant that a Levallois flake-implement, deeply ochreous (Case S), comes from Reculver, in striking contrast to the condition of the same type of implement from Northfleet (fig. 22). The coast-line is here rapidly receding on account of the soft material of the cliffs (100 ft. high near Reculver), and the superficial gravel fringes an extensive spread from the Stour valley to the coast known as Blean Forest, mostly 100–200 ft. above the sea. To this plateau-gravel, which ends a little north of the Sturry pits (p. 37) at Stonerocks, but seems to reappear south of the Stour, may perhaps be assigned the primitive palaeoliths found above Fordwich (left of Case 65), all of which were collected and given by Dr. A. G. Ince. It might be held that the Reculver gravel, which stretches inland for two miles and has an average breadth of one mile, belongs to the 100-ft. terrace of the Thames, as it is that height and more above

the sunk channel of the river; but this theory does not explain the continuous stretch of gravel ten miles long between the coast and the valley of the Great Stour, which at Chilham is two miles from its southern edge. The gravel at Howletts near Bekesbourne, one mile east of Canterbury, which yielded several implements (Case 65) to the late Captain Lewis Moysey, is clearly a terrace deposit 60 ft. above the Little Stour, which joins the main river in the old channel of the Wantsum. The unrolled specimens, which alone give any indication of the deposit, are mostly large, of St. Acheul I type, pointed and more or less ovate; and there is one

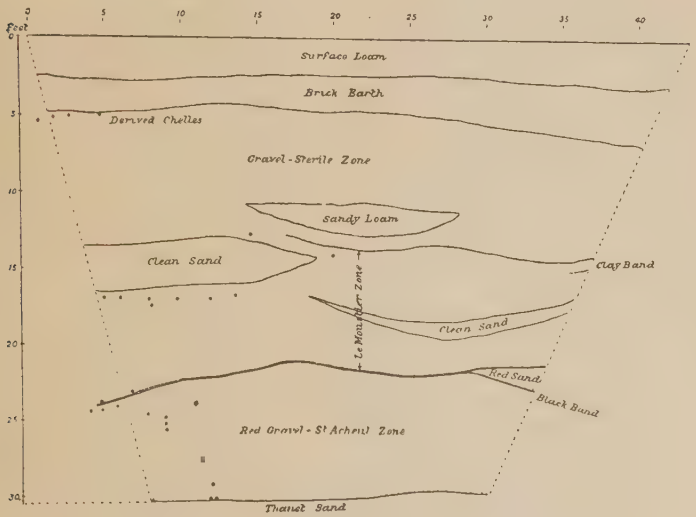


Fig. 25.—Section in gravel-pit, Sturry, Kent.

flake with whitish patina which might rank as a 'point' of Le Moustier.

Large numbers of palaeoliths have come from the gravel-pits at Sturry (two miles north-east of Canterbury) in recent years, but Dr. A. G. Ince was the first to investigate both site and implements methodically, and the specimens illustrated (fig. 26) are from his own collection, presented in 1924. A record was kept of the exact position of hundreds of implements in the gravel-pit close to the Herne Bay road, which reveals a small valley 30 ft. deep running parallel to the Stour at a height of 70 ft. O.D., the 100 ft.-contour passing through the pit. It is thus a notch in the hill-side between the positions of the 100 ft. and 50 ft. terraces. Part of the eastern face of the pit, which crosses the valley, is seen in fig. 25 at its deepest point; and it is clear that the

ferruginous gravel, which has an average thickness of 6 ft. at the bottom, is of St. Acheul date, as unrolled hand-axes of that culture are numerous at that level: for instance, fig. 26, *d*, was found at

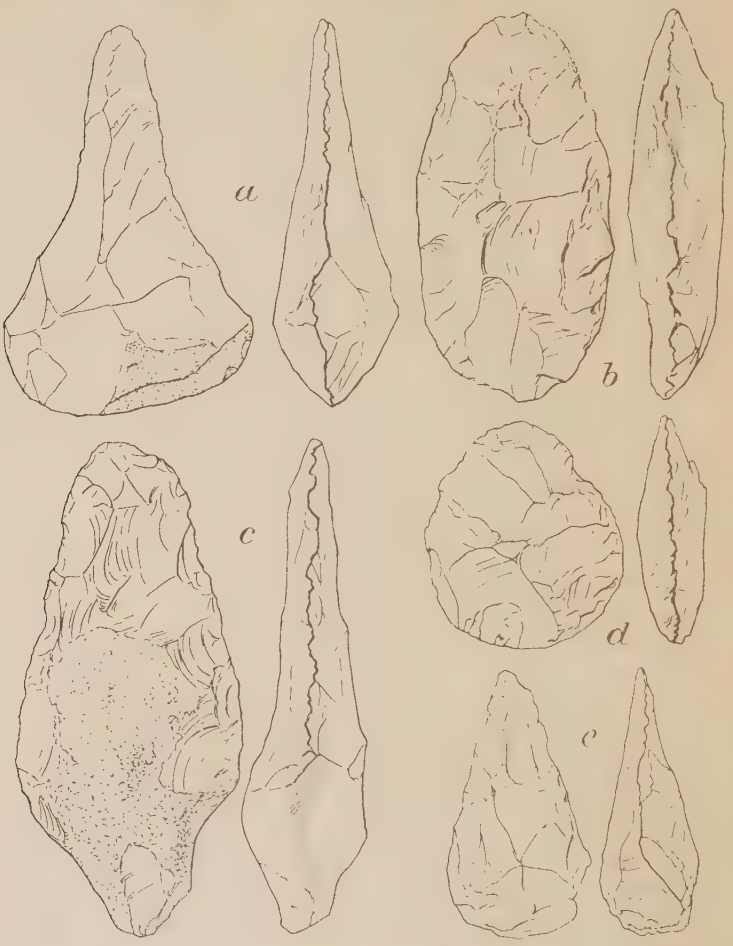


FIG. 26.—Implements from gravel, Sturry, Kent. ($\frac{1}{3}$)

25 ft. from the surface and *b* at 19 ft. The next prolific horizon was a few feet below the upper black band, about 14–18 ft. from the surface, the flints being of St. Acheul II and Le Moustier character: thus fig. 26, *c*, was on the lower Le Moustier level at 18 ft. and *c* at 15 ft., while *a* is referred to upper Le Moustier,

though earlier in appearance. A good 'tortoise'-core from which a flake-implement has been detached is exhibited with a selection from the pit in Case 66. About 9 ft. from the surface was a barren layer; near the top of the upper gravels and sands, at about 6 ft. from the surface, were found a few rolled hand-axes of Chelles and St. Acheul types, evidently derived from higher ground; and at the 4 ft. level, between the loam and the underlying brick-earth, were a few small implements of the Cave or neolithic period, but not of characteristic forms. On the south side of the pit the Thanet Sand rises and forms a bank separating it from the main valley of the Stour. Masses of sand described as 'rafts' are a conspicuous feature of the current-bedded layers in the middle of

Fig. 27.—Ochreous implement, much rolled, Canterbury. ($\frac{1}{2}$)

the section (fig. 25), and it is difficult to explain their presence unless they were brought in a frozen condition from an outcrop of Thanet Sand, and there are other indications of ice-action in this excavation.

Canterbury itself has produced some interesting specimens, and among those from a gravel-pit at the gas-works (top of Case 67) are some derived ochreous hand-axes (fig. 27) and some fresher flakes of large size comparable with those from Vauxhall and neighbouring sites (top of Case 70 and drawer in Case R). A white subtriangular implement from St. Stephen's pit is referable to the period of Le Moustier and of rare occurrence, the butt-end being thin and square, as though for a cutting-edge like one from Dunbridge in Case S.

A rough but interesting series from Luton, near Chatham, due to the researches of Mr. S. K. Turner (Case 70 and drawer in R),

has a striking resemblance to specimens from Fitz-James, Oise (Case 106), officially assigned to the period of Le Moustier. The general patination is chalky white, the flakes being of irregular outlines with some battering, and implements scarce. Some recall the Strépy type (Case 99), consisting of cylindrical nodules pointed at one end ; but there is one battered hand-axe of late Drift character with the same patination. The tumbled deposit in which these were found about 120 ft. O.D. was formerly regarded as stony brick-earth, but has now been recognized officially as Clay-with-flints (p. 65).

At Twydall, half-way between Chatham and Upchurch, near the Medway, many implements have been found in gravel above the chalk, but not methodically excavated. The best series is in

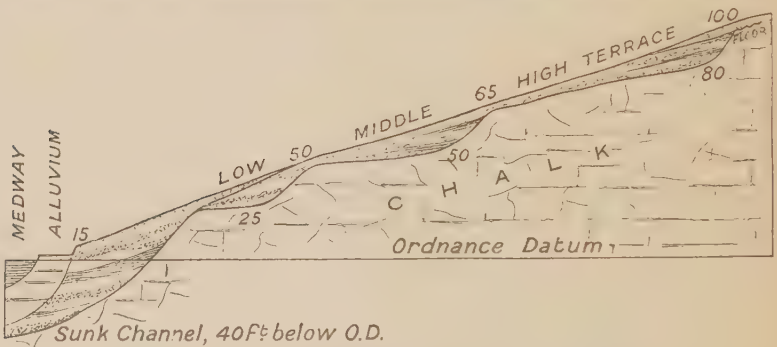


Fig. 28.—Sectional diagram of Medway bank, Frindsbury.

Rochester Museum ; and among the few here shown (Case S and drawer in R) may be mentioned Mr. J. P. T. Burchell's gift of a square-ended hand-axe (of a type frequent at Romsey) and two steep-ended side-scrapers of Le Moustier appearance. There is another *racloir* in Case 70, with an implement of 'dolphin' type.

The Northfleet find has much in common with the working 'floor' discovered and published by Messrs. W. H. Cook and J. R. Killick at Frindsbury, on the Medway opposite Chatham Dockyard. Terraces at 100 ft., 50 ft., and 25 ft. O.D., are well seen in section (fig. 28), though superficially there is a continuous slope from the summit of the chalk cliff to the river, which is here tidal ; and there is sufficient evidence of a sunk channel reaching at least 40 ft. below O.D. As at Northfleet, the position of the find may be explained by an adjoining outcrop of the Upper Chalk with abundant raw material ; but here, in Le Moustier times, flint-working went on just beyond the brink of the 100 ft. terrace, at 102 ft. O.D., where the chalk is covered with a calcareous loam with flints. In this a channel about 50 ft. wide and $4\frac{1}{2}$ ft. deep

in the middle had been cut and filled with a brick-earth not found elsewhere in the neighbourhood, both loam and brick-earth being subsequently covered by a foot of unstratified red loam and the top soil. On the furrowed surface of the chalk and within the channel were found 17 isolated heaps of raw material, a few implements, and a large number of black or partly patinated flakes, which have been joined together again in many cases. All these had been covered, but not disturbed, by the brick-earth, and may be regarded as a single industry (Case S). The two hand-axes (fig. 29) are a good clue to the date, and there are a few side-scrapers: but (as at Northfleet) the main product was flake-implements struck from tortoise-cores, and hundreds of flakes are

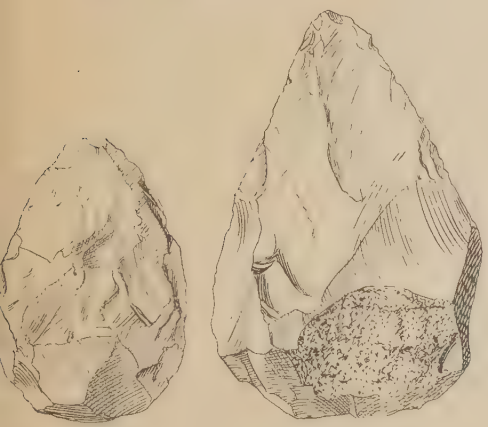


Fig. 29.—Two hand-axes from working-floor, Frindsbury. ($\frac{1}{2}$)

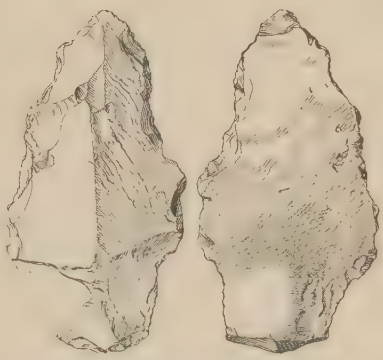


Fig. 30.—Tanged flake (front and back), Hayes Common, Kent. ($\frac{1}{3}$)

evidence of failures to effect this object. Here, however, the cores were very roughly shaped, being in some cases barely recognizable as 'tortoises'; and the butts are never facetted, in striking contrast to Northfleet. This may affect the chronology, but it will suffice to refer to the High Lodge series, which has the same flat striking-platform. A brick-earth channel in a corresponding position at Wansunt (p. 31) contained flakes that fitted together, but the implements were of a different type.

Nearer London there are some signs of occupation in the early Cave-period (Middle Palaeolithic); and in view of recent discoveries at Předmost, Moravia, it is possible that the peculiar flint (fig. 30) found near Hayes station, Kent (Case 69), was, in spite of its superficial resemblance to a spear-head, hafted like an axe for hunting or fighting. The tang is thick and still shows the large bulb of percussion characteristic of some Le Moustier work, such

a date being indicated also by its discovery on Thanet Sand under 12 ft. of gravel, in association with bones of the mammoth and woolly rhinoceros. It was presented by Sir Hercules Read, late Keeper of the Department, in 1916; and there is a parallel from Egypt in the Horniman Museum at Forest Hill. Reference may also be made to one from Lakenheath, Suffolk (drawer in Case S); and somewhat similar forms have been published from East Dean, Sussex, and from Denmark.

Attention may next be directed to the north bank of the Thames, the gravels and brick-earth of north-east London having proved rich in palaeolithic implements. The district now stands at 70–90 ft. O.D. and when being built over in 1878–85 was carefully studied by Mr. Worthingon Smith, part of whose collection is exhibited in Cases 63, 64. The higher ground, overlooking both the Thames and the Lea, is capped with gravel (now referred to the Taplow terrace) which rests on the London Clay, and is itself covered for the most part by a contorted drift now recognized as Trail (a glacial deposit) which here and there has been denuded. Where the palaeolithic level thus crops out on the surface, entirely unabraded implements have been found; and their condition is enough to show that they do not belong to the surface series. A diagram showing disturbance above and horizontal bedding below is exhibited at the side of Case 63.

The palaeolithic floor has been traced at Stamford Hill and Kingsland, in the City of London at 70 ft. above O.D., and at Highbury. The first implement from the floor was found in a river-deposit at the 80 ft. level, and 22 ft. below the present surface. Many others have been found on the east bank of the Lea, though the palaeolithic floor has there been pushed away by the Trail, or otherwise denuded. It may, however, have originally extended by outliers over the greater part of East Middlesex into Herts. as far as Hertford and Ware, to Luton, Dunstable, Caddington, and Hitchin, and possibly in patches on both sides of the Thames from Oxford to the Nore. This floor or occupation-level belonged not to the Lea valley, but to that of the Thames, as is shown by the bedding of the river-deposits; and as a similar deposit of brick-earth occurs in the neighbourhood of Brixton and Clapham on the south, it is clear that at one time or another the river flowed over a valley 7 or 8 miles wide at this point. Between Highbury and Clapham, both of which at different periods were on the actual banks, the valley is over 5 miles wide. The floor itself consists of a layer of some 5 or 6 in. of sub-angular ochreous gravel, but in some places is only visible as a line of slightly contrasted colour. The gravel contains numerous unabraded implements and flakes of primitive character and brown or blackish colour, as well as bones of extinct animals in association with them (Case 63). The implements are ovate and pointed, associated with a large number

of scrapers, hammer-stones, flakes, and cores, a Le Moustier date being indicated by such characteristic side-scrapers as fig. 31. Below the floor, at a depth of 12 ft. or more, is another bed of gravel, containing rolled fossil bones, and implements which are lustrous and slightly abraded. Both pointed and ovate forms occur, generally larger than those from the palaeolithic floor above them. Scrapers are found, though somewhat rarely, on this level, but none in the deepest pits from 12–40 ft. deep, where the coarse gravel, resting on the London Clay, produces deeply ochreous or brown implements, rude in make and greatly abraded. They may be compared with a specimen from Canterbury in Case 66

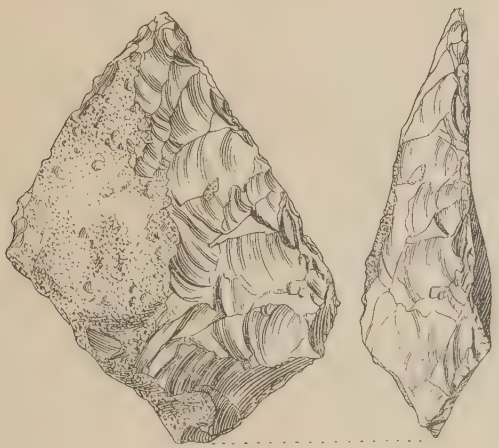


Fig. 31.—Side-scraper, Le Moustier type, Stoke Newington. ($\frac{1}{2}$)

(fig. 27). Above the floor the Trail also contains implements, but these are all more or less abraded, and have been brought from the north or north-west, probably by slowly moving, half-frozen mud, for a distance of 30 miles, with a fall of at least 700 ft. As at Caddington this contorted drift contains the sweepings of the hills and valleys, and naturally encloses palaeoliths of different ages.

Some flakes found at Stoke Newington Common and struck off by palaeolithic man from the same core are here shown fitted together again, as evidence that the manufacture of flint implements took place on this site, and that very little disturbance of the surface occurred when the upper beds were deposited. On the same shelf should be noticed a large chopping tool from Stoke Newington, which is well adapted to the hand as shown (fig. 32); and an implement from the same locality made of quartzite, a material that was very rarely used in this part of the country

and is extremely difficult to flake on account of its hardness. A good ovate from Hackney Downs is slightly rolled, the surface there being 70 ft. O.D., and a long pointed implement from Clerkenwell has the edges only dulled. One, apparently for use as a chopper, came from Drury Lane (fig. 33), and other specimens from London are in Case 65: besides that on the *frontispiece*, two implements (one at 17 ft.) and two scrapers are shown from Gray's Inn Road; there is a large, rolled specimen with curved sides, found 10 ft. deep in Woburn Square near the Museum: and Mount Street (between Berkeley Square and Park Lane) has produced a subtriangular implement with one face chipped flat.

Fig. 32.—Chopping tool, Stoke Newington. ($\frac{1}{4}$)

All these discoveries have been on what is now considered the middle (Taplow) terrace of the Thames; and it has been remarked that most of the implements belonging to the 12-ft. gravel (which is below the floor) in the London district are found between the 50-ft. and 100-ft. contour lines of the Ordnance maps. 70–75 ft. being the most productive level. Above the 100 ft. line, and below the 50 ft., examples from this gravel are somewhat rare; and this accords well with discoveries in the western suburbs.

The terrace-gravels at Acton (50–100 ft. O.D.) examined by Gen. Pitt-Rivers in 1870 (diagram on left of Case 65) are now referred to the middle or Taplow terrace of the Thames, and a few of his specimens are in a drawer (Case R). A typical section showed (below the surface soil at 82 ft. O.D.) 4 ft. of brick-earth with seams of white sand, resting on $4\frac{1}{2}$ ft. of gravel with seams of white sandy clay: between this gravel and the London Clay shelf

were found some flint flakes so sharp that they must have been struck off the core on the spot. The site of a flint factory was explored by Mr. Allen Brown at Creffield Road, Acton: it was 100 ft. O.D. and about 6 ft. from the modern surface, under brick-earth, the date of which is fixed by the Levallois flakes (Le Moustier period) which it covered with hardly any disturbance.

Implements from the present bed of the Thames may be interesting, though not useful in dating the deposits as they may have come originally from the plateau or any of the terraces; but one is illustrated (fig. 34) from Hammersmith as a rare type in Britain, known abroad as a *ficron* (fig. 117), the name given by

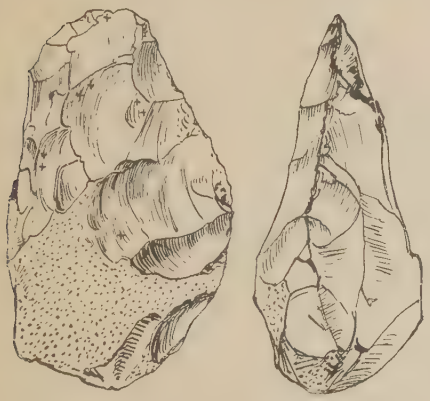


Fig. 33.—Implement with cutting-edge, Drury Lane. ($\frac{1}{2}$)

Fig. 34.—Pointed hand-axe, Thames. ($\frac{1}{4}$)

French workmen to the (single) iron point of a punt-pole. This example is highly lustrous and much rolled, probably of Chelles date. An exceptional specimen (fig. 35), flaked on both faces but dating from the period of Le Moustier, comes from the Thames at Tilbury, and may be related to one from Taplow in Case S (fig. 36) which has one flat face and the special features of fig. 125 exaggerated—one side almost straight ending in a right angle at the base, and the other with a fuller curve and rounded below, where there is often a thickening or striking platform, plain or facetted. The base becomes thinner and turns into a cutting-edge, foreshadowing the celt (cf. fig. 75).

A few rolled implements of small dimensions in Case 64 come from an extensive gravel spread at Hanwell (surface 65–70 ft. O.D.). The marbled blue and white flake implement from a brick-field at Hayes Bridge, Southall (Case S) has a facetted butt and basket-patina like pl. II, no. 2. The edges are sharp and

indicate a brick-earth of Le Moustier date. Botwell (between Southall and West Drayton) has produced a tortoise-core as well as a sharp flake with facetted butt (Case 66); but Iver farther west seems to belong to the higher (Boyn Hill) terrace, and has yielded many rolled implements (Case 65), one measuring $8\frac{1}{4}$ in. with a slender point. The gravel is here overlain by brick-earth at an elevation of 145 ft., and should be distinguished from the

Fig. 35.—Hand-axe of Le Moustier type, Tilbury. ($\frac{1}{3}$)

Fig. 36.—Implement with one flat face, Taplow. ($\frac{2}{3}$)

spread on Iver Heath farther north (222 ft. O.D.). The gravel at Lent Rise (between Taplow station and Burnham) is on a higher shelf than the station pit (which gives its name to the middle terrace of the Thames), and reaches 120 ft. O.D., its thickness averaging 14 ft. According to Mr. Ll. Treacher it is related to the Furze Platt gravel at Maidenhead (intermediate between the two terraces), and has proved extremely prolific. The sharp hand-axes of St. Acheul I type are said to come from the top of the chalk, and one specimen with a slender point measures no less than $9\frac{1}{2}$ in. On the left of Case 65 is a reproduction of a still larger hand-axe ($12\frac{1}{2}$ in.) from Furze Platt, the original having been presented by Mr. Treacher to the Natural History Museum;

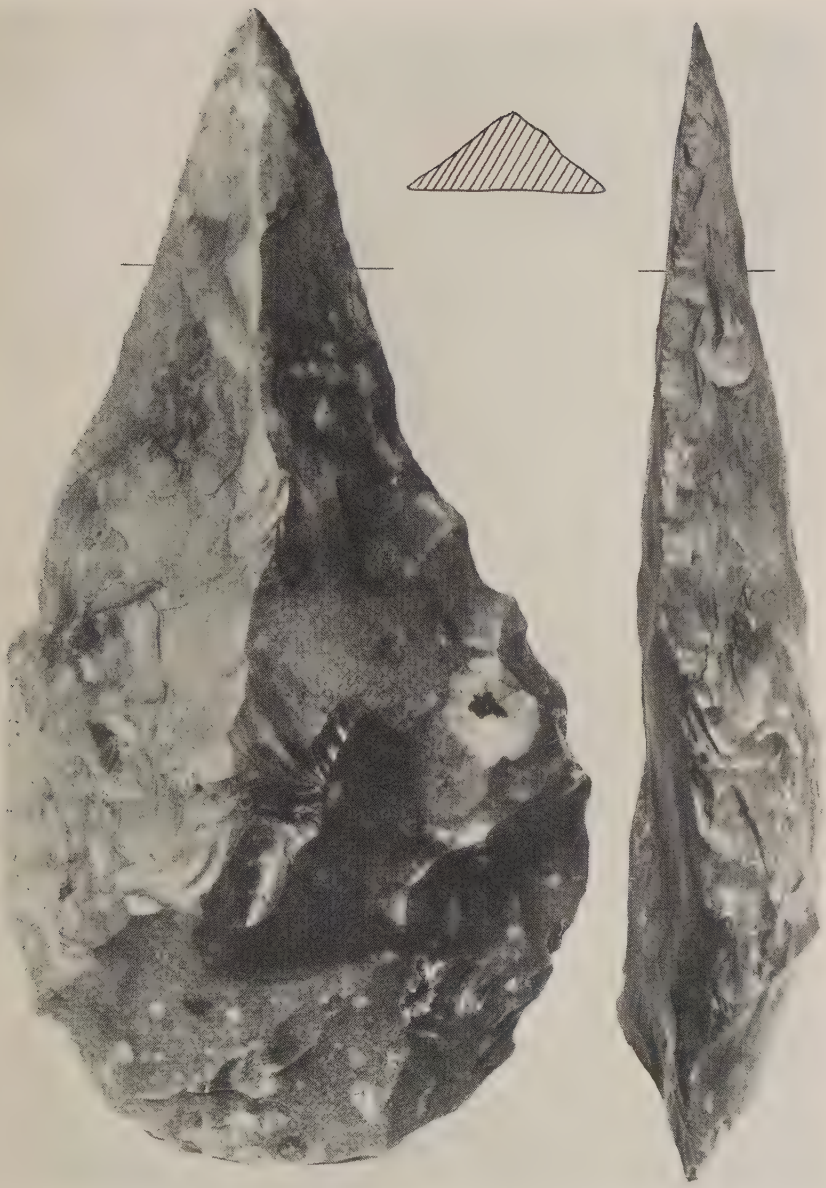


PLATE III.—SHARP-POINTED IMPLEMENT, HENLEY, OXON. (¾)

(Case 67, *see* p. 47)

and his gift in Case 67, with a fine point of triangular section and a total length of 8 in. (pl. III), was found in brick-earth at least 130 ft. above the Thames at Henley. It is suggestive of the period of La Micoque (p. 122).

Mr. Worthington Smith instituted a comparison between the deposits of north-east London and those of Caddington and other sites on the slope of the Chiltern Hills twenty-seven miles to the north-west; and his researches give a clue to the prehistory of the intervening area, which was nearly all covered with Boulder-clay at the time of the greatest southward extension of the ice-sheet (p. 9). Two miles from Luton, on the boundary between Hertfordshire and Bedfordshire, Caddington stands upon the chalk, which is here capped with brick-earth and stony clay; and in the brick-yards (500–600 ft. above Ordnance datum) a gently undulating streak was observed from 4 to 13 ft. below the surface. The discovery from time to time of flint implements on this line led to the conclusion that here was a level on which palaeolithic man lived and worked. In some cases two levels were noticed about 2 ft. apart, and though these may have coalesced in other spots, there was a difference in the mineral condition of the implements from these two horizons. The lower or true palaeolithic floor furnished specimens with a grey or indigo marbled surface, while those from the upper level were whitish, inclining more to those from the floor than to another series nearer the surface. The accompanying diagram (fig. 37) shows the original land-surface AA full of narrow vertical fissures, perhaps made by the sun during a hot summer; these were filled up by brick-earth, brought down perhaps by a heavy storm of rain, and a new surface was formed at BB, on which level the whitish flint implements occur. Above this is a contorted drift which bears ochreous flint implements of St. Acheul or earlier types. These ochreous specimens are slightly abraded, some with numerous white scratches; and have evidently been transported by natural drainage from a still higher position, where the earliest known inhabitants of these parts lived on a surface of chalk-with-flints, red clay-with-flints, and Boulder-clay. This was subsequently denuded, and formed a deposit several feet thick in the old valleys, now the highest ground in the neighbourhood. Thus the uppermost layer of implements is the oldest of the three, and their mineral condition,

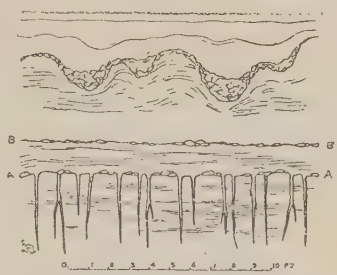


Fig. 37.—Section through palaeolithic land-surface, Caddington.

which of itself would be a fair test of age, here agrees with the evidence of geology. The relative positions of the three beds also throw light on the periods of human occupation in this district. No implement whatever has been found in the undisturbed Boulder-clay of this area, and there is little to show how long after the epoch of maximum cold these implements were left on the old land surface of the higher ground; but the implements found in the lower layers were certainly manufactured before the deposition of the upper contorted drift now called Trail, which indicates a cold period after the settlement of this area by man.

An interesting corroboration of the sequence thus established is the occurrence of a re-chipped ochreous implement on the palaeolithic floor. This is a solitary instance, and it is evident that an old implement had been found by palaeolithic man in the brown stony clay and re-pointed, only to be abandoned at the advance of flood-waters which enveloped that and other human relics in a layer of brick-earth without shifting their position. An implement has a minute flake replaced that might easily have been swept away, and one of two refitted flakes was broken in palaeolithic times and still retains brick-earth in the fracture. It is this that gives a special interest to the discovery, for the heaps of raw material (diagram on left of Case 63), the finished implements, the rough flakes, the cores and hammer-stones are found practically as palaeolithic man left them; and these remains show that there was at least on the lower or true palaeolithic floor a regular flint factory. Hundreds of flakes have been fitted together again in their original positions (Case 63), and in one case all that was missing of a large block was the centre, which, by pouring in plaster, was found to be of a form commonly met with among palaeolithic implements. A similar discovery was made at Crayford (p. 35).

As the sequence in time of the three series of implements is fairly established, it may be noticed that the earliest contained no small scrapers, and closely resembled the ordinary ochreous specimens found in the drift gravels on the terraces of the Thames, and on the surface of the North Downs (Case 62).

The implements from the palaeolithic floor, which were not rolled like the earlier ochreous specimens, and have thus retained their sharp edges, are of a more miscellaneous character, comprising pointed and oval forms, delicately chipped scrapers, hammer-stones and punches, the majority bearing a strong resemblance in form and colour to the later forms of the middle series at St. Acheul (Acheul II); other characteristic specimens are known as 'side-scrapers', resembling some of definite Le Moustier type from High Lodge, Mildenhall (fig. 45). Such scrapers, worked on one face only along the side (French *racloirs*), occur with a white or bluish patina in the upper gravels at St. Acheul.

The same story is told by discoveries in a line S.W.–N.E. through the two Caddington pits—at Round Green and Kensworth Common (Whipsnade), also at Gaddesden Row farther south. These sites range from 530–600 ft. O.D. and are about 130–200 ft. above the nearest streams (Lea, Gade, and Ver). The accompanying sectional diagram (fig. 38) suggests the course of events in palaeolithic times. The river valley was probably shallower than at present when first filled with brick-earth (relaid Eocene clay) to the level of Caddington, the whole district being covered with a sheet of it. Then the Trail (a contorted drift) spread over the brick-earth, and later the valley was cleaned out again and probably deepened by an abundant flow of water from the hills, patches of brick-earth and Trail being left isolated on the summits or plateau. It is clear that in late St. Acheul times man was camping from time to time on successive levels of the brick-earth, unrolled implements and

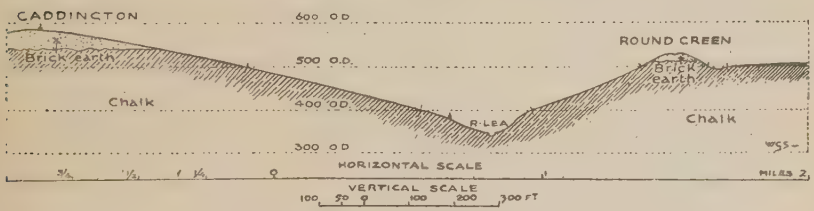


Fig. 38.—Section of upper Lea valley, showing brick-earth.

flakes being found as deep as 35 ft. from the surface. Here can be detected traces of Le Moustier technique (flake-industry); and the Trail would therefore correspond to the continental glaciation which ran its course during the period of Le Moustier. In any case it is the last glacial manifestation on the Chilterns, and credit is due to the late Mr. Worthington Smith for finding such conclusive evidence.

The illustrated specimens are all from the brick-earth, and are almost entirely white, creamy, or biscuit-colour. The side-scraper from Round Green (fig. 39, *a*) is of Le Moustier type and specially interesting in view of M. Peyrony's recent discovery of *tranchets* or Shell-mound axes at Le Moustier itself: the transverse cutting-edge is seen here as on two examples from Mr. Reid Moir's Ipswich series (p. 79). The finely pointed hand-axe (fig. 39, *b*) is in the Hoxne style (fig. 44), and another with incurved sides (fig. 39, *c*) is naturally pierced through the butt and belongs to a type represented also in the ochreous drift above. The long ovate (fig. 39, *d*) is an uncommon Drift form, suggestive of the Cissbury celt (fig. 78). The Gaddesden Row series includes a fine pointed ovate with S curve (fig. 40, *a*); a small cordate hand-axe

(fig. 40, *b*) very like one from the Trail at Ipswich (fig. 43, *b*) which, however, is deeply ochreous; and the dawn of the flake-industry is marked by a delicate end-scraper (fig. 40, *c*). A chopper approaching the segmental or 'tea-cosy' type is seen in fig. 41,

Fig. 39.—Implements from brick-earth, Round Green, Luton. (½)

with crust all over the base; and a flake of the intractable local rock called Hertfordshire puddingstone also comes from this locality. Another lump, evidently shaped by man, from Markyate Street near Luton, is in the adjoining Case.

A parallel case has been observed just south of Foxhall Road near Derby Road station, east of Ipswich, where the gravel and

brick-earth were first examined by Miss Nina Layard in 1902 and several implements obtained from the workmen. The site was methodically excavated in 1914 and again in 1922, so that the geological and archaeological conditions are well ascertained, and

Fig. 40.—Implements from brick-earth, Gaddesden Row. (½)

Fig. 41.—Segmental tool, Gaddesden Row, Herts. (½)

go far towards solving the relation of palaeolithic cultures to the various glaciations of the Ice Age. The plateau, covered with glacial sand and gravel, is here 130–40 ft. O.D., flanking a depression about 120 ft. O.D. in which the following sequence was observed, in descending order:

1. Sandy surface soil, about 2 ft. 7 in.
2. Reddish gravel with pockets of sand } 4 ft. 3 in. Chalky
3. Passing into sandy clay with grey patches (called Pug). } Boulder-clay.

4. Laminated dove-coloured brick-earth, 3 ft. 3 in. 5. Bluish brick-earth with scattered stones, 3 ft. 6–10. Beds of brick-earth and loam, 6 ft. 6. in.	Interglacial deposits.
11. Sandy clay with chalk fragments, 2 ft. 6 in. 12–13. Shingle and loamy sand, 6 ft. 9 in. 14. Dark grey Boulder-clay, Jurassic shells (proved by boring).	Chalky Kimmeridgic Boulder-clay.

The entire depth was over 31 ft. and the above identifications are due to Prof. Boswell, who concludes that the culture of St. Acheul (found in beds 4 7) is later than the Kimmeridgic Boulder-clay, which is possibly contemporary with the North Sea Drift (Cromer Till and Contorted Drift); also that the early Le Moustier with its cold fauna (beds 2–3) can be equated with the Chalky Boulder-clay. While the North Sea ice was retreating

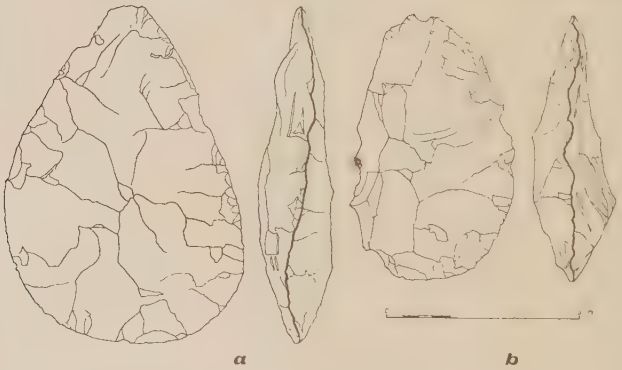


Fig. 42.—Ovate implements, Derby Road, Ipswich.

from Norfolk, the inland ice may have been advancing towards Suffolk by way of the Fens, that area being denuded of its outcrop of Kimmeridge Clay in the process.

Three specimens are exhibited which were excavated with others and carefully recorded in 1914. The best (fig. 42, *a*) is a twisted ovate hand-axe, 5·2 in. long, sharp and brown with lighter veins and spots, and both sides curved like a reversed S: it lay in dove-coloured clay at 8½ ft. from the surface. The second (fig. 42, *b*) has the peculiar Warren Hill patina (pl. II, no. 3) on one face, and was found at a depth of 7 ft. in clayey gravel; the other (fig. 43, *a*) is a small brown ovate implement with one face chipped flat, and a basil point: from grey clay at 11½ ft. A well-formed cordate implement (fig. 43, *b*) with ochreous patination was presented by Mr. Reid Moir who visited the pit on the day it was found, and satisfied himself that it came from below the contorted gravel (bed 2) at a depth of 12 ft. The contrast in colour with the implements found in the brick-earth is instructive as it agrees

with the Caddington series 70 miles distant. Many other implements from the Derby Road site are in Ipswich Museum; and the known stratification of at least thirty has given meaning and importance to the remainder. A glaciation following the deposit of St. Acheul implements would be identified by most authorities as Würm (p. 15), but the Boulder-clay at the bottom of the section seems to be the equivalent of the North Sea Drift, which may be connected with the Mindel glaciation.

Hoxne brickyard, on the south bank of the river Waveney which divides Norfolk and Suffolk, is a classical site, as it was here that John Frere made his famous discovery in 1797 (p. 7); and the implements recovered from the brick-earth are remarkable in more than one respect, but the deposits have not yielded

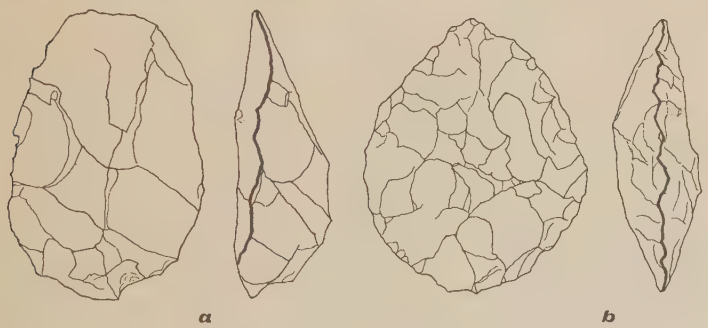


Fig. 43.—Implements from Derby Road, Ipswich. ($\frac{1}{2}$)

all their secrets. The excavations begun in 1895 by a committee of the British Association were stopped by water, but it is agreed that originally there was a small lake in the Boulder-clay, and the following section has been known for thirty years:

1. Brick-earth with freshwater shells, wood and palaeolithic implements.
2. Gravel and carbonaceous loam.
3. Black loam with leaves of Arctic plants.
4. Lignite with temperate plants.
5. Lacustrine clay with temperate plants.
6. Sand full of water, at base.

In 1924 Mr. Reid Moir again exposed the section, and measured 20 ft. of lacustrine clay, which had silted up the lake and given rise to a thicket of alders, subsequently converted into lignite, and associated with freshwater shells, fish-bones, and temperate plants. Then a subsidence caused further lacustrine deposits 20 ft. thick, with Arctic willow and other species indicating extreme cold. Above this was a thin seam of gravel, covered with brick-earth and sealed in by a tumultuous mixture of gravel, sand, and clay, due to cold conditions, which were separated from the glacial

Boulder-clay below by a temperate period. It has long been thought that the local implements were proved to be later than the latest Boulder-clay of East Anglia, but this view has again been called in doubt, and typical hand-axes seem to belong to the 8-ft. level in the brick-earth, under a contorted drift which is equated with the upper Boulder-clay of Le Moustier date. Three from the series exhibited on the left of Case 65 are here illustrated (fig. 44); and all are remarkably fresh.

The High Lodge which is famous for Le Moustier implements is in the north-west angle of Suffolk, nearly two miles north-east of Mildenhall, and due north of Warren Hill on the same ridge. Excavations carried out in 1920 have at least supplied a working hypothesis with regard to the sequence and dates of the

Fig. 44.—Three implements from Hoxne, Suffolk. (¼)

different deposits on and near the summit of the hill, which rises nearly 120 ft. above O.D. At the highest point is a deposit of Boulder-clay 25 ft. thick; and only 200 yards away, just below the 100-ft. contour, is (or was) the brick-earth which produced an abundance of worked flakes in the style of Le Moustier (fig. 45), several side-scrapers of fresh black flint being shown in Cases 68 and 70 (top). Prof. Marr was one of the excavating party and explained the geology as follows: the brick-earth series was deposited upon the lower Boulder-clay, with a junction sloping westward down the hill; and after its deposition a channel was eroded in which was laid down a coarse gravel, and ultimately the upper Boulder-clay accumulated on the surface of the gravel. The conclusion is that the brick-earth with its Le Moustier flints was laid down between two glaciations, or at least two advances of the same glacier. The gravel lining the trough cut in the lower Boulder-clay is, according to local information, the source of

many St. Acheul implements, with bluish chips on the edges that have been explained by ice-action. Even if found above the brick-earth, these precede the period of Le Moustier, and there can be no doubt as to the age of the ovate implements, which must have been abundant in the immediate neighbourhood to be swept in such numbers into the gravel of this ridge, for Warren Hill can be linked up with this member of the High Lodge series (p. 56).

The flints here exhibited (Case 68) from the Greenwell collection evidently came from the mottled red and blue clay of Mr. Skertchley's section seen about 1876—Sand 6–2 ft.: Boulder-clay, 4 ft.: coarse chalky flint gravel, 6 ft.: mottled red and blue clay,

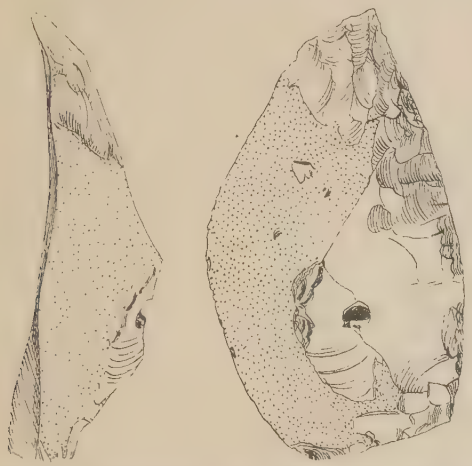


Fig. 45.—Side-scraper from brick-earth, High Lodge, Mildenhall. ($\frac{1}{2}$)

containing several worked flints, 5 ft.: Boulder-clay, seen to 2 ft. at the base of the pit. A fine hand-axe with basil point (fig. 46), as fresh as the flakes, has been given by Mr. Samuel Fenton who found it on the hill about the year 1870.

In this and other collections it has been observed that the striking-platform of flints from the brick-earth at High Lodge is always plain—not facetted like the Levallois or Northfleet flake-implement. This may be a local peculiarity or mark a difference in date, the Levallois flake being often assigned to St. Acheul II. In any case these flints differ in many particulars from the Northfleet industry, being smaller and more varied in form, without the predominance of the flake-implement properly so called. Their condition is surprisingly fresh, and to all appearance they have been manufactured from freshly mined flint of excellent quality—

which takes flint-mining, whether deep or superficial, back at least to the period of Le Moustier.

Warren Hill, or Three Hills, a sandy ridge half-way between Mildenhall and Icklingham in north-west Suffolk, has long been a problem to geologists and archaeologists alike, but is explained to some extent by the stratification of implements at High Lodge, $\frac{3}{4}$ mile to the north. Hundreds of ovate implements, indicating the St. Acheul period, have been collected from the loose sandy gravel of the hill, which Mr. Reid Moir suggests is the equivalent of the Middle Glacial gravels of East Anglia. On this theory the lower Boulder-clay is buried under the gravel, and the upper Boulder-clay, with the brick-earth of High Lodge, denuded from the top of the quarry.

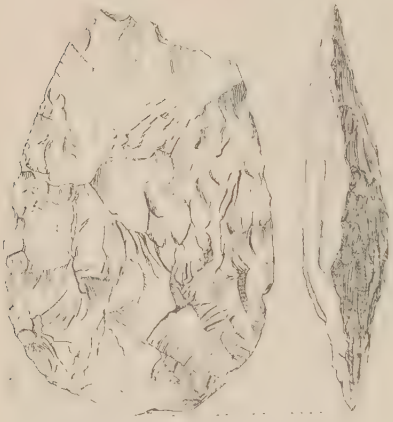


Fig. 46.—Hand-axe with basil point, High Lodge. ($\frac{1}{3}$)

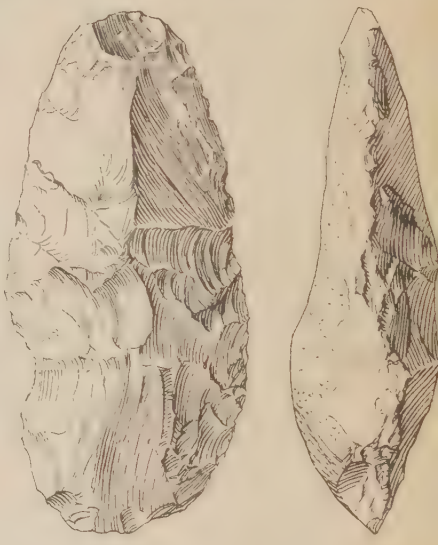


Fig. 47.—Hand-axe, Warren Hill, near Mildenhall. ($\frac{2}{3}$)

The site has yielded an abundance of ovate hand-axes with all shades of patina, and often with pale blue chips on the edges, explained by glacial action after the patination was complete. A limiting date is thus obtained for the deposition of the gravel, which is the result of a glaciation and has no relation to the River Lark which flows at right angles to the hill. Many specimens have a peculiar spotted surface, where the patinating agent has attacked the minute circular cracks due to battering in gravel (incipient cones of percussion); and the characteristic colouring is yellow and indigo (pl. II. no. 3), occasionally found elsewhere (example from Biddenham in Case 65) but never so abundantly as at Warren Hills. An example (fig. 47) given by Mr. Buscall Fox is remarkable also for its celt-like outline (Case 68).

This is certainly the richest area in flint implements so far discovered in this country, and is drained by the Lark and Little Ouse. East of Warren Hill is Icklingham (chiefly rolled ovates in Case 67), where the low-level gravels used to be dug for road-making in the Fens; and farther up the Lark is Bury St. Edmunds (Case 68), which has produced twisted ovates and huge white flakes, the latter in the style of Le Moustier and presumably from brick-earth, which is plentiful locally, as at Sicklesmere. Twelve miles to the north is Thetford, on the Little Ouse, which is here represented by several rough implements of Chelles character; and farther down the river are Santon Downham (pale ochreous hand-axes in Case 70, a disk (fig. 48) and side-scraper in Case 70) and Brandon (various, with some small ovates in Case 69). North of Brandon is Broom Hill in Weeting parish (unrolled specimens in Case 69); and to the south-west Wangford (three flakes in Case 69) and Lakenheath have proved productive, as well as other sites north of Mildenhall overlooking the Fens.

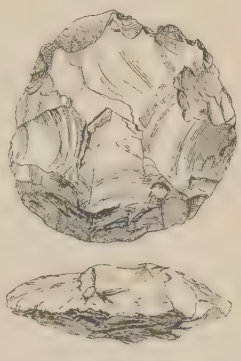


Fig. 48. — Flint disk, Santon Downham, Suffolk. ($\frac{1}{3}$)

South of Mildenhall a remarkable series from the 10–15 ft. level in gravel-pits near the railway station at Kennet, near Newmarket, has been collected and given by Mr. C. R. Jennings. Most of them are water-worn, and groups displaying a great variety of patination are exhibited in drawers below Case S. Some of the smaller specimens are in the lower part of Case 65, and the less water-worn are mostly ovates, indicating a St. Acheul date for their manufacture, and possibly a Le Moustier date for their deposit in the gravel, which here and elsewhere consists of the sweepings of the countryside. Incipient cones of percussion, appearing as minute rings or specks on the surface, are well seen on many of the blue-black examples from this site, and result from continual battering in transport. A rolled example of the tortoise-core is exhibited in Case S and is presumably contemporary with the Northfleet series.

It was held by Sir Joseph Prestwich in 1861 that the Great Ouse had cut through a thick sheet of Boulder-clay at Bedford and was therefore of post-glacial date; but since his day it has been shown that the Suffolk river-valleys are lined with Boulder-clay and must therefore have been cut down to about their present depth before one at least of the local glaciations. There is no reason to suppose a different course of events in Bedford, almost in the same latitude; and a glacial intrusion in the Biddenham

gravel has been officially taken as evidence that the gravel was there in pre-glacial times. It now caps a low hill about 2 miles long, and yields implements on a level 40 ft. above the Ouse: remains of the cave-bear, reindeer, stag, urus (aurochs), hippopotamus, woolly and slender rhinoceros, the straight-tusked elephant, mammoth, horse, and cave-hyaena being well represented by fossil bones. From this and the Kempston pits (both at 130 ft. O.D. outside the county town) a large number of implements have been collected (first by James Wyatt in 1861), and the majority are entirely ochreous.

A typical series is exhibited in the lower part of Case 65 and in a drawer of Case S including five broad flakes with facetted butt

Fig. 49.—Re-pointed implement, Kempston, Beds. ($\frac{1}{2}$)

(Le Moustier type), and a pointed implement with lateral butt and one face yellow, the other marbled with spotted indigo (the black core showing through a film of patina), illustrating an earlier stage of patination, as at Warren Hill.

A small specimen from Kempston on the shelf above (pl. II, no. 1) is remarkable as showing two distinct periods of flaking in palaeolithic times. In fig. 49 the crust of the original pebble is seen towards the butt-end, and the surface of the implement, as first chipped, at B: subsequent contact, probably with iron in some form, has stained this surface, which contrasts strongly with the flaking D done at some later date; and the extent F to which the flint has been thus affected is shown by the different colour of a recent fracture E at the tip of the specimen. These and other indications go to prove that much of the patination was effected before the implements were enclosed in the gravel, by prolonged exposure on the surface; and unequal discoloration of the two

faces sometimes indicates exactly how the flint lay for an indefinite period, the patination being more thorough on the upper face, though a heavy ferruginous deposit is often concentrated on the lower face.

Examples of a fossil shell the size of a cherry (*Coscinopora globularis*) found at Kempston are in Case 63. The globular body has a natural perforation but this has in many cases been enlarged artificially as if for threading; and seeing that many have been found, here and at Caddington, in groups, it has been thought that they were worn as beads by palaeolithic man. The practice is proved by finds in the French caves (p. 135).

Hitchin is 15 miles to the south-east of Bedford, in one of the gaps in the Chiltern Hills, and is famous for its deposit of brick-earth with implements. Well-borings have proved an unexpected depth of glacial drift in the V-shaped breach of the chalk escarpment known as the Hitchin–Stevenage gap. Hitchin is in the middle of the broadest part of the valley, and Ickleford is about a mile to the north, a little over 200 ft. O.D. The deepest boring near Hitchin showed a drift of varying composition to a depth of 345 ft. (68 ft. below sea-level), 64 ft. at the top being mostly brick-earth. Here as elsewhere the filling is largely glacial, with striated boulders of travelled rocks, and it is clear that the sunk channel is earlier than at least one of the Boulder-clays. The comparatively late date indicated by the implements does not necessarily apply to the Thames, which was admitted, through a similar gap at Goring, into the older Kennet valley; but the sunk channel of the lower Thames is generally considered to date long after the formation of the terraces.

Some unusual specimens are exhibited at the top of Case 69 (from a site called the Folley), on the floor of Case 66 and in a drawer of Case S (Highbury, 300 ft. O.D.). In the first group should be noticed a twisted ovate very like that from Derby Road, Ipswich (fig. 43, *b*), which was also from brick-earth. There are several large pointed implements with one face chipped flat (not true flake-implements); and a small white ovate with the S twist, as well as some definite side-scrapers (*racloirs*), but the site was not systematically explored, and classification is hardly admissible.

In Cases 69 and 70 as well as in a drawer of Case R many implements are shown from the gravel at Knowle Farm, Savernake Forest, Wilts., which has been known since 1901 chiefly for the 'gloss' (presumably a silicious deposit) on many of the flints, covering crust as well as flaked surfaces. It occasionally appears elsewhere (p. 87), and there were evidently special conditions in this pit to account for it, but they have never been demonstrated. The average size is small and the form generally stumpy, but there are several larger implements of different forms and patinations, and the workmanship throughout is not of the highest

standard, perhaps due to inferior material. The Knowle Farm gravel-pit is situated about 450 ft. above the sea on the side of a river valley (now dry) cut 40 ft. deep in the chalk rock; and, according to Rev. H. G. O. Kendall, shows the following succession of deposits containing implements:

1. Close to the surface, flaked stones of indeterminate age, and occasionally palaeoliths below the turf where it rests on river-drift.

2. In places a foot or two of 'dirt', containing blue and white rolled and striated implements.

3. Sandy river-drift, 2-4 ft. deep, with worn and striated implements, but also some sharp and unabraded in the looser

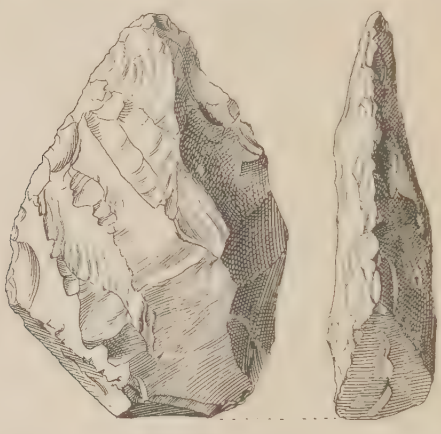


Fig. 50.—Chert hand-axe, Lizard, Cornwall. ($\frac{1}{2}$)

part; flakes, hammer-stones, and burnt flints, and in a thin layer a large quantity of 'microliths', or minute flakes carefully trimmed. Eolithic forms plentiful here, but contemporary with the palaeoliths.

4. Ochreous gravel, in some parts 12 ft. deep, with rolled and unrolled implements at base; and comparatively few with cores, flakes, hammers, and burnt stones above.

The site was also examined by Mr. Clement Reid, who considered that the valley had been lowered 40 ft. since the gravel was deposited by intermittent floods washing angular material from the slopes above, the deposit including Tertiary pebbles and greywethers. He suggested that the gravel was contemporary with the deposits of Southampton Water, Bournemouth, and the Avon valley, and more ancient than the Coombe rock of Brighton or the lowest terrace-gravels of southern England.

Mention should be made of the isolated hand-axe of chert from the Lizard, Cornwall (fig. 50), as Drift implements are exceedingly

scarce in the south-west of England, no doubt owing to the absence of raw material fresh from the chalk. A substitute was, however, obtained in quantity at Broom (near Axminster in the Axe valley between Dorset and Devon), which has long been famous for implements made from a peculiar honey-coloured chert, obtained locally and as easily recognized elsewhere as Grand Pressigny flint abroad. A fine series was secured at an early date for the Salisbury Museum, and the industry may be safely assigned to St. Acheul times, ovates and slender pointed hand-axes predominating. The series exhibited under the main shelf of Cases 69, 70 ranges in length from 9 in. to $2\frac{1}{4}$ in. and includes many types, ovate, lanceolate, and triangular, with slender and basil points, but nothing of very primitive form and no late flake-implements. One specimen is illustrated to show the curving sides (fig. 51), the dotted line indicating the direction of the opposite edge. This is not an unusual feature in the later Drift period, but the curve, when present at all, is generally in the form of S and not S.

Fig. 51.—Twisted implement of chert, Broom, Dorset. ($\frac{1}{3}$)

An interesting example of Broom chert was found in 1876 at Castle Cary, Somerset — a small pointed ovate in Case 69. Supplies direct from the upper chalk were again available in Dorset, and four ovate specimens with white patina from the neighbourhood of Blandford are in Case 67. Palaeoliths from the south coast are more numerous between Bournemouth and Portsmouth than farther east in Sussex and Kent, but agreement has not yet been reached as to their geological significance. One possibility to be considered is the former existence of a large river combining the waters of the Frome, Stour, and Avon, and flowing by way of the Solent and Spithead into the sea east of the Isle of Wight. It has been called the Solent River (fig. 52), and near its mouth it would have been joined by the Southampton River (now represented by Southampton Water) which received the Test, Itchen, and smaller rivers draining Hampshire. Another geological postulate is the Channel river which flowed west of the land-bridge between Britain and France along the Hurd Deeps, and took the waters of our southern rivers (including the Solent River) as well as the Seine, Somme, and others in North France to the Atlantic. Depression of both shores no doubt helped it to cut back into the land-bridge and form the Straits of Dover, admitting the colder waters of the North Sea. Dates for its lateral expansion as far

north as Brighton, for instance, and the isolation of the Channel Islands are suggested by archaeological discoveries (p. 66).

The existence of a river south of Bournemouth involves an unbroken ridge of chalk from the neighbourhood of Swanage (Isle of Purbeck) to the Needles of the Isle of Wight, and the theory presents no difficulty, but does not necessarily explain the vast spreads of gravel on the high ground between the lower Stour and the coast, on the New Forest which rises to 420 ft. above O.D.

Fig. 52.—The river Solent and tributaries, Pleistocene period.

on its northern edge, and round Southampton. It has been pointed out that the slope from the Bournemouth watershed to the Stour militates against the theory that all these gravels belonged to one vast sheet spread from the north over an early plain of marine erosion; but it is, on the other hand, difficult to imagine even the huge volume of the Solent River depositing gravel on a continuous slope with a sandy subsoil 14 miles from its main channel. Another point is that many of the Bournemouth implements are quite sharp, and were presumably made and used near the site of their discovery; but those in a drawer of Case R are all rolled and several ochreous. Hundreds have been collected from the base of the gravel on an average 120 ft. above the sea (on the top of the present cliff), and even from the sand below the gravel: the types are definite and well represented, mostly of early St. Acheul date, and the occurrence of a small percentage of

chert implements can be easily explained by the abundance of that material in the Axe valley near Broom (p. 61), whence the finished implements might be conveyed by man, or by drainage along the Stour and Frome valleys, when those rivers were flowing at a much higher level.

The occurrence of Mr. Herbert Druitt's set of four of these comparatively rare chert specimens at one spot in the Talbot Woods north of Bournemouth (140 ft. O.D. or 115 ft. above the Stour) shows that they were little disturbed by the water that laid down the gravel, whether the deposit be called fluviatile, fluvio-glacial, or marine. A bluff or degraded cliff attributed to sea-action about 150 ft. O.D. can be traced at intervals from Bournemouth through the New Forest to Goodwood Park and beyond (p. 66), and a raised beach is corroborative evidence; but tidal movement would have battered the flints more than flood-waters inland, and even the 'rolled' implements of the district (estimated at 95 per cent.) do not seem to have had such a history.

The Bournemouth gravel extends to Boscombe and Pokesdown, the latter site yielding a sharp, boldly flaked hand-axe of Chelles character, $9\frac{3}{4}$ in. long, given by Mr. W. M. Newton, as well as small rolled ovates presumably of St. Acheul date; and between the two sites was found a curious slug-shaped implement deeply ochreous, presented by Dr. T. G. Longstaff, who was convinced, by investigation on the spot, that it came from the sand below 6 ft. of gravel, consequently 100 ft. or more above the sea. It is $6\frac{1}{2}$ in. long, quite unrolled, with the working end steeply flaked as if for planing, though the under face is hardly chipped level enough for that purpose. The section is oblong throughout, approaching a square in places.

Both rolled and unrolled specimens, of various types (Case 70), come from the summit of Milford Hill, Salisbury, about 100 ft. above the Avon, where there is a capping of unstratified gravel. The lower Salisbury Avon is decidedly rich in implements, and one of the best pits is at Wood Green, near Breamore, where the gravel is about 200 ft. O.D. and 100 ft. above the river. One found deep in gravel there is shown in Case 67, and others are in a drawer (Case R). That from St. Catherine's Hill, near Christchurch, where the gravel is 160 ft. above the Avon, is made of chert and much rolled, evidently derived from the west like those of the same material in Case 67 from Shirley (Southampton) and Barton Cliff (Lymington).

It may be added that the famous white implement discovered by Sir Joseph Prestwich in 1869 at Redlynch, Downton, is in the Natural History Museum. The gravel from which he believed it had recently come lay at 320 ft. O.D., the Avon at the nearest point flowing at 117 ft. O.D. It was therefore well above the so-called palaeolithic terrace of the Avon which is generally con-

sidered to be 150 ft. above the river, and closely corresponds with the alluvium in gradient.

East of the lower Avon the plateau-gravels of the New Forest have yielded implements of special interest. Three of primitive type come from the gravel at Stony Cross near the northern escarpment at 369 ft. O.D. (pl. IV. nos. 1. 2. 4); and the donor, Dr. T. G. Longstaff, has made full inquiries into this and other discoveries on the brink of the Avon valley, at Rockford Common (200 ft. O.D.), Poulner (150–200 ft.), Crow Hill (100 and 200 ft.), and Hightown, Ringwood (170–200 ft.), including several small ovates; as well as on Setley Plain (near Brockenhurst) at 138 ft. O.D. (pl. IV, no. 3). These are all regarded as plateau rather than river-gravel finds, as it is difficult to connect the New Forest spread with the fluviatile deposits east and west of it. Palaeoliths are abundant on what is now the southern edge of this gradual slope, as at Barton Cliff (Case 67) and Southampton, where most are found at Shirley and on Southampton Common (100–160 ft. O.D.). The gravel slope continues farther south-east, but along the eastern shore of Southampton Water there seems to be also a low terrace. At Warsash a pointed specimen was found 15 ft. in gravel (Case 68), and many have been collected at Hill Head, near Portsmouth. A large one in the same Case has two lateral platforms like a rostro-carinate (fig. 13) and may be a primitive hand-axe manufactured on the same lines. Most from this site, however, are long ovates, ochreous and much rolled, perhaps by exposure on the present beach after falling from the gravel capping the low cliff. Those from the Test valley obviously come from terrace-gravel, which is impregnated with iron, imparting a deep ochreous colour to most of the implements. An exceptional specimen $8\frac{3}{4}$ in. long, presented by Sir Hercules Read, was 6 ft. deep in gravel at Romsey, where Belbin's pit has proved most prolific (Case 68). Farther up the river, a large number have been found at Dunbridge and presented to Winchester Museum by the late Mr. Wm. Dale: a few are in a drawer of Case R, with deep ochreous patina, contrasting with the delicate white implement of

Fig. 53.—White implement, Dunbridge, Hants. ($\frac{1}{2}$)

PLATE IV.—IMPLEMENTS FROM THE NEW FOREST, HANTS.
(Case 67, *see* p. 64)

peculiar type (fig. 53) in Case S, which is difficult to date exactly, but may represent the transition stage of La Micoque (p. 122). The Dunbridge terrace is 150 ft. O.D. but about the same height (70 ft.) above the river as the Romsey pits. The gravel is 14–20 ft. thick, and for about 6 ft. at the top is whitish, the iron having been bleached out; but the implements were probably white before they were included in the upper gravel. A flat subtriangular implement (Case S) from this horizon is like one from St. Stephen's, Canterbury (p. 39).

The best series from the Isle of Wight (Priory Bay) is at Oxford; but a cordate implement probably of Le Moustier date, found by Mr. Thos. Codrington in 1867 in brick-earth capping the Foreland Cliff, is in Case 68. On the mainland opposite, many flints were collected at high levels by the late Col. Jamieson (below T) and

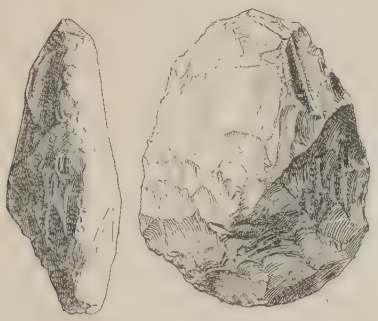


Fig. 54.—Ovate hand-axe from raised beach, Slindon. (⅓)

connected by him with the capping of Clay-with-flints, from which they had apparently been derived, as on Portsdown (300–400 ft.), Blendworth Down (400–500 ft.), and Broadway Farm, near Catherington. In recent years Mr. Henry Dewey, of the Geological Survey, has found two implements *in* a similar deposit in Kent, but it is now acknowledged that Clay-with-flints is of variable age and may be still in process of formation, so that worked flints found in it cannot be dated by the deposit as they would be in terrace-gravels. Ovate implements of late Drift type have repeatedly been found on the surface of the plateau, high above and far away from the valley-gravels; and if they were not dropped by palaeolithic hunters, but swept into plateau-gravel or brick-earth by natural agencies, they furnish a clue to the date of the last serious disturbance of the uplands, and most authorities agree that the culture of Le Moustier was connected with a severe glaciation.

A thick subtriangular hand-axe, white with bluish patches, barely rolled (fig. 54), is stated by the donor, Dr. Eliot Curwen,

to have been found in a raised beach (now a gravel-pit) in Slindon Park, which is a continuation of the Portsdown and Goodwood beach. Another shore-deposit, presumably less ancient, passes through Sussex at a much lower level: traces of it have been noticed at Worthing and Selsey, also at Bembridge in the Isle of Wight; and east of Brighton the beach is visible above the old chalk cliff at Blackrock. Here it is surmounted by 60–80 ft. of a tumbled deposit of chalk and flints known as Coombe-rock, but called by Mantell in 1822 the Elephant-bed, on account of the numerous remains of the mammoth contained in it. The glacial origin of this deposit has been already referred to (p. 32), and a limiting date

Fig. 55.—Ovate hand-axe from raised beach, Brighton. ($\frac{1}{2}$)

for the beach below is afforded by a rolled ovate implement (fig. 55) apparently of St. Acheul type, found at Blackrock and presented by Mr. W. Deane. It was firmly embedded about the middle of the shingle stratum which is there 7 ft. thick, the vertical distance between the chalk floors of the old and modern beaches being 17 ft. The overlying Coombe-rock has also yielded a palaeolith, now in Brighton Museum; and it seems clear that the beach is not earlier than St. Acheul, while there is good evidence for assigning the Coombe-rock to the period of Le Moustier. It may, however, represent the Riss (not the Würm) glaciation in southern England, and has been equated with the Rubble Head of the south-west coast.

How to reconcile the flint-types found at Limpsfield, Surrey, with the geological data remains a difficulty, but the facts seem clear enough. There are two series from the neighbourhood—

ochreous ovates from the gravel on the Common (about 520 ft. O.D.), and implements of the same type as well as flakes, but all creamy-white, from brick-earth on the brink of the Greensand escarpment (about 590 ft. O.D.). The gravel is about 50 ft. above the headwaters of the Darenth, but now lies on the watershed dividing that river from the Oxted stream (a tributary of the Eden). The late Mr. Montgomerie Bell's collection is now at Oxford, but a few ochreous implements from the Common are shown in a drawer of Case R. They may be compared with some from West Wickham, Kent, in the same Case; and the same contrast of patina is well seen in the Caddington series, the white examples coming from brick-earth in both localities. It remains to be seen how far the parallel extends; but in any case the occurrence of ochreous ovate implements in gravel far above the present river-level is of primary importance.

Much attention has been given to the gravels and implements of Farnham, Surrey, by Mr. Henry Bury, who distinguishes four terraces of the Wey—A, the present watershed between that river and the Bourne, and not so much a terrace as an extension of the Alice Holt plateau, which is 150 ft. above the river; B, with its base at 120–130 ft. above the river, is 30 ft. higher than C; and D, the lowest terrace, 50 ft. above the river, cut like the others in the Lower Greensand. Implements are common from all levels, and are dispersed in several collections, about a dozen being exhibited here, but without details of origin. The latest from the edge of the plateau (360 ft. O.D.) are of St. Acheul type and generally large (5–8 in.), many being unrolled and similar to those from terrace A, where they are said to come from the base of the gravel, a few with white patina being near the surface. Smaller implements come from B, most of them being made of an opaque cherty flint more or less ochreous and often coated with iron oxide. Of 300 implements nearly half are much water-worn, and the types represented include ovates, disks, and small pear-shaped implements (as fig. 17), also a long oval, thick in the middle, resembling a Cissbury celt (fig. 78); but in another pit of the same terrace there is a marked absence of rolled specimens and flakes, which are common elsewhere, most occurring at the base of the gravel. In C hand-axes over 4 in. long are commoner than in B, many are unrolled, and those with sharp edges are difficult to classify. Large ovates are very scarce; but the pear-shaped implement persists in this terrace, and a few of the flakes have facetted butts in the style of Le Moustier (p. 33) and may be classed as Levallois, though the bulb is not unusually large. Dark flint of good quality was used and the flakes are decidedly thin. The lowest terrace D is superficially conspicuous and as much as 400 yards wide, ending in a bluff down to the river. The gravel is paler under the brick-earth and has yielded a few

remains of mammoth and woolly rhinoceros; but implements are comparatively scarce and as a rule much water-worn. One measuring 10·7 in., deeply ochreous and slightly abraded, has been assigned to the developed Chelles type (*Chelléen évolué*): there are a few white implements, Levallois flakes (one from brick-earth), and perhaps a tortoise-core, like fig. 21.

It is now usual to include the period of Le Moustier in the Drift though the name comes from a famous cavern in the Dordogne (p. 126); and frequent reference has already been made to specimens of that period from gravels in this country. Though the later stages are barely represented in river-deposits, there is no reason to believe that the south-east of England, which was devoid of limestone caves, was also uninhabited in Aurignac, Solutré, and La Madeleine times, but the difficulty is to distinguish periods in the mass of surface-finds. In the chalk area any remains of man, if present at all, must often be contained in a few inches of soil, which has probably been turned over time after time by the plough; but there are a few cases in which a group of late Cave-period flints have been covered up without disturbance (as at Uxbridge and North Cray); and as several palaeolithic surface-deposits or 'floors' have been recognized in France, some dating even from Le Moustier times, it would not be surprising if certain groups in England proved to be of equal antiquity. In such cases much would depend on form and patination, two elements in themselves unconvincing but deriving some authority from the results of Cave-exploration.

The scientific value of bone-caves was recognized at an early date in England. As long ago as 1816 the systematic exploration of a cave in the Devonian limestone at Oreston, near Plymouth, was undertaken by Mr. Whidbey, and the former existence of the rhinoceros in that region was fully established. This discovery followed close on the exploration of the Gailenreuth cave in Franconia, and preceded by about four years the publication of Dean Buckland's researches at Kirkdale, near Helmsley, in the North Riding of Yorkshire. The *Philosophical Transactions* of the Royal Society for 1822 contain an account of the cave, as well as the Dean's famous deductions from the evidence obtained, which pointed, as he thought, to a universal deluge. The *Reliquiae Diluvianae*, published in 1824, owes its title to this preconception, and from the high scientific standing of its author, had an important influence on the study of early man. Besides several bone-caves in Germany and other parts of Europe, animal remains from many of which are exhibited in the Natural History section of the British Museum at South Kensington, the Dean described in more or less detail the discovery of bones of extinct animals at Kirby Moorside (near Kirkdale), at Hutton in the Mendip Hills, Somerset; at Balleye and Dream Cave, Wirksworth, Derbyshire;

three sites at Plymouth ; and Crawley Rocks and Paviland (Goat's Hole), near Swansea. Some interesting drawings and diagrams are included in Dr. Buckland's work, and the discovery of the entire skeleton of a rhinoceros in the Dream lead-mine may be mentioned as being of special interest.

The impetus thus given to the exploration of bone-caves resulted in the patient and successful investigation of Kent's Cavern, Torquay, by the Rev. J. McEnery between 1825 and 1841 ; and the occurrence of flint implements in intimate association with fossil bones proved that man was contemporary with animals now extinct or not represented in this country. His researches were subsequently verified on the same site by Mr. Godwin Austen in 1840, and six years later by the Torquay Natural History Society ; but the final examination of the cave extended over twelve years, and some of the results are shown in Cases 71, 72 (p. 70), others at the Natural History Museum.

The more important of the palaeolithic cave-dwellings are marked with black pins on the map of England and Wales at the foot of the western spiral staircase, and it is clear that some of the sites were included in the area covered by glaciers during the great Ice Age. There is now geological as well as archaeological evidence that some of these retreats (as Cae Gwyn) were utilized by man before at least one of the glacial periods ; and the occurrence of quartzite and flint implements of very rude workmanship suggests an antiquity as great as that of the human handiwork discovered in the Drift-gravels.

An early habitation of prehistoric man on the slope of Windmill Hill, near Brixham, Devon, is generally known as the Brixham Cave, and was excavated under the superintendence of a committee of the Geological Society, the necessary funds being supplied by the Royal Society. The cavern was formed by the action of water as it eroded the valley ; and to the draining of the higher gravel is due the deposit of gravel at the base of the excavation, where water-worn stones but no fossils occur. During occasional droughts the cave seems to have been frequented by animals, their remains, however, being very scarce in that bed, while indications of man are comparatively numerous. As the valley became deeper, the cave became drier and was more resorted to by beasts of prey ; but during a long period intermittent floods must have deposited the silt forming the cave-earth. This layer contained about 95 per cent. of the bones found in the cave, and an occasional flint implement shows that man was living in the neighbourhood though the small series here exhibited is not sufficient to fix the exact horizon. One hand-axe of Chelles type survives, pale ochreous in colour and imperfect : part was found in one gallery in Aug. 1858 and the point in another a month later. In the upper part of the cave-earth bones of the bear were

very numerous, and the remains of cubs show that for some time this retreat was given over to that cave-haunting carnivore. Finally, as the floods ceased to reach the level of the cave, drippings from the roof deposited the layers of stalagmite which sealed up and preserved in an undisturbed condition the shingle and cave-earth of preceding eras. The cave, however, still continued to be the occasional resort of beasts of prey ; and remains of the reindeer, together with those of the bear and rhinoceros, were found in the stalagmite floor. From that time detached blocks from the roof and the accumulation of débris rendered the cavern inaccessible to man. The entire antler of a reindeer, imbedded superficially in the stalagmitic floor of this cave, is in the Natural History Museum.

Kent's Cavern is in a limestone hill flanking a valley which about half a mile to the south terminates on the south coast of Devon, about a mile east of Torquay harbour. It has been examined and excavated in part on more than one occasion, but a thorough exploration was carried out between 1868 and 1880 by a committee of the British Association. The excavations were mainly directed by Mr. Pengelly, of Torquay, who also acted as reporter ; and it is mainly to his careful and systematic work that we owe our knowledge of the early conditions of life in this the most important cave-dwelling in the country.

Though all the strata were not uniformly represented, the following is the descending order in which they occurred :

1. Blocks of limestone fallen from the roof, weighing from a few pounds to upwards of one hundred tons each, and in some parts cemented together by carbonate of lime.

2. A dark mud, known as the black mould, from three to twelve inches thick, consisting largely of decayed leaves and other vegetable matter.

3. Stalagmite floor, commonly of granular texture, from one inch to upwards of five feet in thickness, frequently interspersed with limestone blocks.

4. Confined to an area of about one hundred square feet was the black band, about four inches thick, mainly composed of small pieces of charred wood.

5. Light red clay, known as the cave-earth, containing on the average about 50 per cent. of limestone fragments, and various remains covered with thin stalagmite films. In some parts of the cave, this layer was not present, and elsewhere it was never more than four feet thick.

6. Wherever the bottom of the cave-earth was reached, there was found a stalagmite floor of crystalline texture, and sometimes as much as ten or twelve feet thick. Isolated crystalline masses also occurred in the cave-earth.

7. The lowest and oldest deposit in the cavern was composed

of rounded pieces of quartz and dark red grit embedded in a sandy paste of the same colour. This is called the BRECCIA.

Implements of the Stone Age in this cavern range from the earliest Drift period to the polished stone implement of neolithic times. Man was evidently living on or near this site during the formation of the dark red breccia; and his implements found in the lowest levels are of rude and massive forms with unsymmetrical outlines (fig. 56), now attributed to the Chelles period; but they must have been carried in through fissures in the roof by water, not deposited in the cave by man. They differ from those

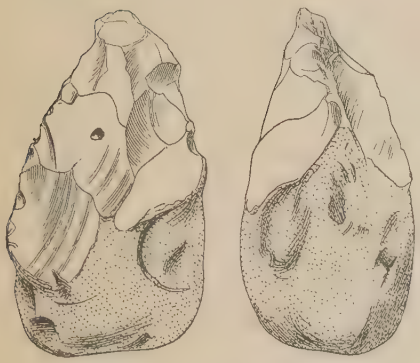


FIG. 56.—Implement of Chelles type, Kent's Cavern. ($\frac{1}{3}$)

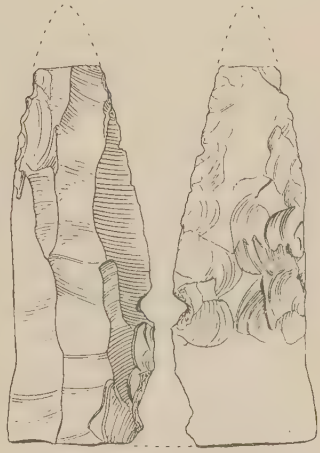


FIG. 57.—Flake of proto-Solutré type, Kent's Cavern. ($\frac{2}{3}$)

of later date in being manufactured not from flakes, but from the flint nodule itself. Several specimens are exhibited in the original matrix, and their depth from the datum line or the top of a particular stratum noted on the labels. Towards the top of the breccia the style improves, and the implements are white, not biscuit-colour like those below them. Those in the cave-earth were carefully formed from flakes struck off for the purpose from blocks of flint, and show a more advanced stage of manufacture, corresponding to Aurignac, though one small square with facetted butt is very like Le Moustier specimens from Jersey (p. 125). The horizon is not recorded, but a white flake (fig. 57) shows pressure flaking on the bulbar face in the proto-Solutré style, the predecessor of fig. 64, no. 1. Besides flint implements, the cave-earth yielded three bone or horn harpoon-heads (of which one is shown) with one row

of barbs in late La Madeleine style (fig. 58), hammer-stones (fig. 59), objects resembling whet-stones, and a badger's tooth bored for use as a personal ornament. The granular stalagmite yielded a white flint lump bruised at one end, and the cutting-edge of a polished celt certainly of neolithic date. The black mould or uppermost deposit is separated from the preceding by a crust of stalagmite that must have taken a long time to form; and contained the largest group of flint flakes, dating from the period of La Madeleine, but also much later objects such as the Bronze Age socketed celt and gouge in Case 55, which are succeeded by fragments of ornamented pottery dating from early British and Romano-British

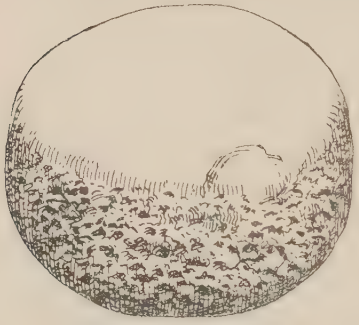


Fig. 59.—Quartzite hammer-stone, Kent's Cavern. ($\frac{2}{3}$)

Fig. 58.—Barbed harpoon-head, Kent's Cavern. ($\frac{2}{3}$)

Fig. 60.—Pierced bone pendant, Torbryan Cave. ($\frac{2}{3}$)

times, the contact with Rome being shown by a scrap of the red ware known as Samian.

Animal remains from the prehistoric levels of the cavern show that it was occupied from time to time by wild beasts that are now either extinct or mainly confined to extreme climates. In the granular stalagmite, black band and cave-earth extinct as well as existing species were found. The cave-hyaena was most prevalent, but the horse and rhinoceros were nearly as common. Remains of the Irish elk, wild bull, bison, red deer, cave-bear, brown and grizzly bears were not rare. Those of the cave-lion, wolf, fox, and reindeer were less numerous; and those of the beaver, glutton, and sabre-toothed tiger were very scarce. The bones had been rendered light and porous by the loss of the organic matter (gelatine), and many of them had been gnawed and cracked by hyaenas.

In the lowest deposits (the crystalline stalagmite and the breccia), animal remains were less uniformly distributed, but in some spots formed about half of the deposit. These belonged exclusively to the bears, and there was nothing to indicate the pre-

sence of the hyaena. The bones from these layers were mineralized and brittle, some emitting a metallic sound when struck.

Remains discovered in caves and tunnels of the limestone at Torbryan, near Denbury, Devon, are in Case 72. Most of the excavation was due to the unaided efforts of Mr. Widger, but the published accounts are inadequate, and the diagram in this Case must be regarded merely as indicating the succession of the beds with their principal contents, the more precise measurements of their depths being in some cases contradictory. The upper beds appear to have been generally as follows, in descending order:

1. Angular stones.
2. Black mould.
3. Stalagmite floor.
4. Diluvium, or angular and rolled stones.
5. Stalagmite floor.
6. Cave-earth (red-clay) = reindeer stratum.

Under these, in one part, were clays and sand, with remains of an older crystalline floor such as was also observed in a broken condition at Kent's Cavern; elsewhere, the lower beds were a dark fetid earth with quartz pebbles and with remains of hyaena; a bone-bed with the usual cave-fauna found in this country; and a deposit containing remains of the cave-bear. Some of the animal bones are preserved at South Kensington, and the objects of human handiwork here exhibited are of a miscellaneous description, with insufficient details of their discovery; but the difference in colour of the flint flakes is due to the fact that some are stained by the charcoal bed at the surface of a pit near the entrance, the rest occurring at a deeper level in the same pit. Along with the blackened series was found the interesting little object of bone (fig. 60), which is pierced as though intended to hang by a string to the person. Another, much larger, from the Thames is in Weybridge Museum. The sandstone spindle-whorl may belong to the neolithic or a later period, but there can be no doubt as to the polished stone axe-head here exhibited. The piece of basalt may also have served as an implement, and should be compared with an axe-head of the same material in Case 76, found near Bridlington, on the coast of Yorkshire. Other neolithic implements from this cave are in the Natural History Museum.

Extensive finds in the limestone caves of Somerset are here represented only by four specimens from the Uphill fissure, south of Weston-super-Mare. Three are of chert—a hand-axe with 'basket' patina (p. 45), a 'point' of Le Moustier type, and a blade; and the flint is of proto-Solutré technique (like fig. 57), creamy-white and lustrous.

The famous Paviland cave in South Wales is poorly represented by a few flint and black chert flakes, excavated in 1869,

but these can be referred with some confidence to the Aurignac period in view of recent discoveries in the cave, to be seen at Oxford. A few specimens from a cave known as Long Hole in Gower include a steep-nosed plane, and there are other late palaeolithic remains from Wales in the Natural History Museum.

In Cases 78,79 are remains from the limestone caves of Creswell Crags, on the north-eastern border of Derbyshire, sections of the three principal sites being given with explanatory notes. Both sides of the ravine are much fissured, and the caves open some 15 ft. above the lake formed by the damming of the stream. Excavations were conducted by Rev. J. Magens Mello and Prof. (now Sir William) Boyd Dawkins in 1875-8, and have recently been resumed by a committee.

The following comparative table shows the successions of layers where all occur, in descending order:

Church Hole Fissure.	*Robin Hood's Cave.*
1. Stalagmitic breccia, with charcoal, worked flints, and bones.	1. Surface soil.
2. Reddish cave-earth, with charcoal fragments, layers of charcoal, flint implements, bones, and blocks of limestone.	2. Breccia with a few bones and flint implements: really the cemented top of the Cave-earth.
3. Lighter cave-earth, with similar remains.	3. Cave-earth with bones and flint flakes (above) and quartzite implements (below).
4. Mottled cave-earth, more sandy, with small angular fragments of friable limestone; quartzite and flint implements, and bones.	4. Mottled bed, light brownish matrix; bones and quartzite implements.
5. Light-reddish sandy earth: bone, but no implements.	5. Red sand, with bones and implements of quartzite.
6. White calcareous sand and rock.	

Both these caves were occupied, during the deposit of the lower cave-earth and red sand, by men who made and used rude implements of quartzite (fig. 62). These seem to prove that the hunters of that period belonged to the same race as the dwellers in the open country who have left their implements of quartzite and flint in the Drift-gravels of our rivers. In the breccia and

upper cave-earth of both caves are found implements of a higher order, made of flint brought from a distance and in workmanship like those of the French caves. The similarity to palaeolithic caves in France is also proved by the bone engraved with the head and shoulders of a horse (fig. 61), as well as by implements of bone and antler, such as occur in continental caves of La Madeleine date. A drooping mane is seldom depicted in palaeolithic drawings of the horse, and the forelock is never seen.

The conditions in Mother Grundy's Parlour were somewhat different. Here the strata, in descending order, were:

1. Surface soil.
2. Red sandy cave-earth with cold fauna and Le Moustier flints.
3. Red clay, with bones. } Warm
4. Ferruginous yellow and red sand, with bones. } fauna.
5. White calcareous sand, with no remains.

Fig. 61.—Horse's head engraved on bone, Creswell Crags. (⅔)

In layer 2 were found quartzite implements such as occur in the red sand below the cave-earth elsewhere; but the red clay and ferruginous sand contained a peculiar fauna. The hippopotamus and leptorhine rhinoceros occurred with the hyaena and bison, but the horse, woolly rhinoceros, and mammoth were absent, and there were no traces of contemporary man. The hyaena was the principal occupant of Robin Hood's Cave during the deposition of the lower red sand and clay, but this occupation was interrupted by floods; and while the cave-earth was accumulating, man also made his appearance here and lived chiefly on the hare.

It may be added that the association of the hippopotamus and leptorhine rhinoceros, both animals of southern habit, points to an early Pleistocene date, especially as these animals are often found in company with the *Elephas antiquus*. The hippopotamus is a survival from the Pliocene fauna, and while common in the Drift-gravels, is, like the leptorhine rhinoceros, less frequently found in caves; but the latter species outlived its companions the straight-tusked elephant and hippopotamus, and survived well into Le Moustier times.

Specimens are shown of chipped quartzite evidently fashioned

by man from pebbles (fig. 62); and better worked flint flakes, which show an advance in manufacture. Among the latter may be distinguished forms that correspond to the Font Robert horizon in France (the dawn of Solutré technique) with pressure flaking on the bulbar face near the point, as in Kent's Cavern and Ffynnon Beuno Cave, St. Asaph.

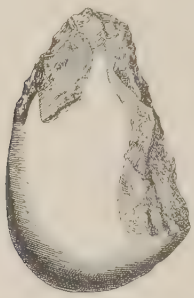


Fig. 62.—Quartzite hand-axe, Creswell Crags. ($\frac{1}{3}$)

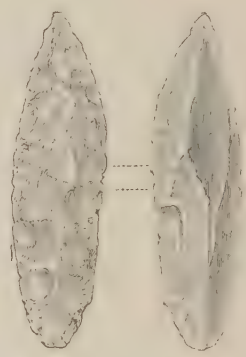


Fig. 63.—Leaf-shaped blade, Creswell Crags. ($\frac{1}{2}$)

Fig. 64.—Flint implements, Creswell Crags. ($\frac{2}{3}$)

The flat leaf-shaped blade (fig. 63) and the lozenge-shaped lance-head (fig. 64, no. 1) are clearly of Solutré date: the scrapers with one or both ends rounded (nos. 2 and 3), and a small oval implement with serrated edge (no. 4) may be contemporary. The bone needle and bone plate with serrated edges are highly suggestive of Montastruc, Bruniquel (fig. 154). A flake $3\frac{3}{4}$ in. long has been trimmed as a graver, and a blade has a spout-like point (fig. 65) comparable with one from Les Eyzies (fig. 136). Blades with oblique ends like fig. 66 are 'battered' along the slope.

PLATE V.—PALAEOLITHIC IMPLEMENTS FROM OLDBURY, KENT.

(Case 72, *see* p. 77)

Specimens of the breccia are shown, containing implements and bones of extinct animals. Two ironstone implements (fig. 67) of oval shape should be noticed from the cave-earth, as also bones of the woolly rhinoceros gnawed by the cave-hyaena.

At the top are five photographic views of the Creswell Crags; and an extensive collection of fossil bones from this and other palaeolithic caves is on exhibition at the Natural History Museum.

Special interest attaches to a small series in Case 72 from a site at Oldbury Camp, near Ightham, Kent, where there appears to have been a rock-shelter under a ledge of rock that has now been

Fig. 65.—Flint borer, Creswell Crags. ($\frac{1}{1}$)

Fig. 66.—Flake with battered bevel, Creswell Crags. ($\frac{1}{1}$)

Fig. 67.—Ironstone hand-axe, Creswell Crags. ($\frac{2}{3}$)

weathered away. Diagrams showing the geological conditions and probable position of the shelter are exhibited at the back of Case 72, and the relics consist exclusively of flints (plate V), some of which are practically identical with Le Moustier specimens. The six specimens represented in the upper part of the plate are flaked on both faces and are small hand-axes, while the lower four are worked only on one face (the plain face of one is shown) and thus agree with Le Moustier. The prehistoric station at Oldbury is on the slope of a flat-topped hill, rising above the Lower Greensand and capped with hard silicious grits of the Folkestone beds that cropped out at an angle, and no doubt afforded shelter to primitive man. The implements are unrolled, and were probably made on the spot, as a large number of small flakes were found in association. The patination varies but most are a dirty white, sometimes mottled with blue (for example, the broken cordate implement): the 'basket' patina (pl. II, no. 2) is also seen (a good indication of

date at St. Acheul), and there are various shades of yellow, the deepest being ochreous.

In Case T are some of the flint flakes found in a gravel-pit at North Cray, Kent, at the junction of the gravel with the alluvium on the east side of the river Cray. Though little can be deduced from the horizon, they were seen by the late Professor Commont and referred to the later Aurignac period, the Belloy-sur-Somme series being quoted as parallel. The edges are so sharp and the surfaces so fresh that they might well pass for neolithic, but the same condition has been noticed at Crayford (p. 35), and the flakes further agree in being refitted together in many instances. The longest here measures 8 in. but one preserved in the Museum of

Fig. 68.—Gravers and end-scraper, Farnham, Surrey. $\frac{2}{3}$

Practical Geology must have had an original length of about 12 in.: it is broken in three pieces and the bulbar end is missing. With one exception (an end-scraper on a blade, not in the Museum), there were no implements found in association, unless the adjoining celt be considered contemporary, which is unlikely as it was found some time before the 'floor' came to light. The surface of a corresponding pit on the west side of the river was about 90 ft. O.D., and below were 3 ft. of gritty alluvial mud and 8 ft. of loose flint gravel, down to the water-level; and according to Mr. R. H. Chandler, who described a scraper-core of Les Eyzies type from this pit, brick-earth, corresponding to that of Crayford on the Thames, was denuded and replaced by the alluvium which he assigns to the period of La Madeleine.

Excavations carried out at Snailslinch farm, $\frac{1}{2}$ mile east of Farnham railway-station (Surrey), by Major Wade were successful in finding a number of undoubted gravers (fig. 68) with many

flakes and cores (evidently remains of a workshop or settlement) in blown sand 6–18 in. from the surface, that deposit being separated by a thickness of flinty clay and sand from the gravel under which are here found unrolled palaeoliths. What interval of time is represented cannot at present be determined ; but the gravers, which are at any rate of palaeolithic origin even if of later date, may help to explain the accompanying flakes (drawer in Case T), which are frequently found elsewhere on the surface and cannot be dated except by a number of associated finds as at Farnham.

Another site that seems to belong to the Cave period, though productive also of pottery, is Bolton's brick-yard on the north of Ipswich, carefully explored by Mr. Reid Moir, who distinguishes Le Moustier, Aurignac, and early Solutré levels in the deposits flanking a small valley, now dry but formerly a tributary of the Gipping. A type series selected by the excavator and approved by the late Prof. Commont is exhibited in drawers of Case T, the earliest group including two specimens resembling the Shell-mound axe (*grand tranchet*), a type usually referred to the neolithic period but now shown by Mr. Peyrony to date also from Le Moustier times.

It is in most cases impossible to decide where primitive man procured the raw material for his flint implements ; but there are two well-known sites in England which have yielded enormous quantities and seem to have been mined in more than one period. The first real step in their investigation was taken in 1867 by Col. Lane-Fox (afterwards Gen. Pitt-Rivers) by deepening some of the saucer-shaped depressions seen on the South Downs at Cissbury, near Worthing, Sussex, where the Upper Chalk reaches a height of 600 ft. above the sea ; but he was deceived by the compact filling of the shafts, and did not reach the bottom of the prehistoric mine till Canon Greenwell had cleared one of many similar shafts at Grime's Graves, near Brandon, Suffolk, in 1870. Many of the implements found by both excavators are in this collection, and more light has been thrown on the subject by Dr. Peake's excavation at Grime's Graves for the Prehistoric Society of East Anglia in 1914 as well as by subsequent discoveries on the site by himself, Mr. Leslie Armstrong, and others since that date.

The prehistoric flint-workings at Grime's Graves cover approximately 20 acres, at about 120 ft. above the sea, on land that has never been cultivated. As many as 366 circular depressions have been counted, which evidently mark the sites of prehistoric mines sunk to the level of the best seam of flint, which was then followed up by means of a network of horizontal galleries. The system is illustrated by a scale-model adjoining Case 61, and deer-antler picks with chalk on which they have been used are exhibited below

Case S, one above (fig. 69) still retaining the imprint of the miner's thumb on a patch of clay. This was presented with other objects in the same Case by Canon Greenwell, but as they were collected not only from his shaft (which was excavated at intervals over a a period of four years, 1867–1870) but from the neighbouring fields, they are not so authoritative as the series methodically excavated from two mines in Case R. The polished basalt celt with pointed butt and almost circular section (like fig. 95), said to have been found in one of the galleries of his pit, is certainly neolithic, and in Scandinavia would be dated after the Shell-mounds and not long before the Dolmens.

The first pit cleared in 1914 was about 32 ft. in diameter at the mouth, funnel-shaped above and cylindrical below, the bottom being about 12 ft. in diameter, and the depth from the surface 30 ft. The interior had been irregularly filled by blown sand,

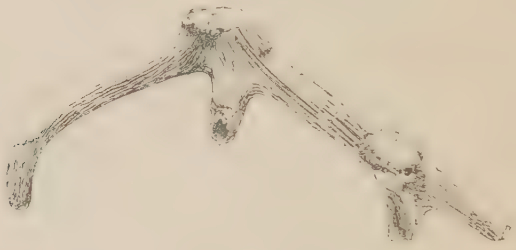


Fig. 69.—Miner's pick of deer-antler, Grime's Graves. (L. 22 in.)

rain-wash and tipping from adjacent mines, but the sides showed in descending order sand, Boulder-clay, top-stone (a band of inferior flint), soft chalk, hard chalk, wall-stone (inferior flint), hard chalk, and the floor-stone, a good black flint easy to work when fresh from the chalk. The unique forms and representatives of the common types from this pit are exhibited with those from Pit 2 in Case R, the labels stating the depth at which each specimen was found.

The second pit was 1 ft. deeper than the first, and about 42 ft. in diameter at the mouth, 14 ft. at the base, the section being much the same as before, though the Boulder-clay was thinner. When the pit had been filled up to within 19 ft. of the surface it was used as a dwelling-place at two distinct periods. The imperfect skeleton of a girl about 4 ft. in stature was found in this pit and is now preserved in the museum of the Royal College of Surgeons, with a calvaria (cephalic index of 75·5) found over 10 ft. deep in pit 1.

The spaces between the pits were largely used by the primitive miners as working 'floors', and hundreds of implements and flakes

have been recovered from them, at varying depths above the sandy decalcified Boulder-clay, in strata recorded, for example, by Mr. Armstrong:

6 in. of humus and sand, with Roman and Early Iron Age pottery.
6 in. of black sand, humus and charcoal, with split animal-bones, 'pot-boilers', hearth with pottery and bronze.
6-8 in. of sandy chalk rubble with bone tools, &c.
3 in. of flint flakes in a compact mass, broken implements, and antler picks.
7-9 in. of chalk rubble, sandy in places.
3-5 in. of flint flakes, raw material, broken implements and engravings; also a large hearth, flint and bone tools, pottery.
Red sand, at a depth of nearly 3 ft.

Two of the engravings on flint-crust (fig. 70) have been presented by the finder, and as the lines are barely visible, they have been

Fig. 70.—Engravings on flint-crust, Grime's Graves. ($\frac{1}{2}$)

filled in with white paint which can be removed at will. The animal grazing is no doubt a red-deer (*Cervus elaphus*), though it resembles an elk in some respects: in spite of technical defects, the concealment of three feet in the herbage is a naturalistic touch in the late palaeolithic style, and there seem to be stalks of grass hanging from the mouth. The other specimen shows sketches of various animals, the clearest being a hind with outstretched head, evidently drawn from life. The deer was abundant in the district and provided picks for sinking shafts through the chalk; but as the animal ranges from the period of the Cromer Forest-bed to the present day, it does not furnish a precise date for the engravings or the mines, and the flints are equally ambiguous. Prof. Commont, however, found rudimentary engravings on the crust of flint at Belloy-sur-Somme, and referred the abundant industry there to the Aurignac period and the transition to Solutré.

Whatever the conditions elsewhere, it was clearly proved by the excavated 'floors' that the mined flint (black when first taken from the chalk) was more deeply patinated on its upper face as it

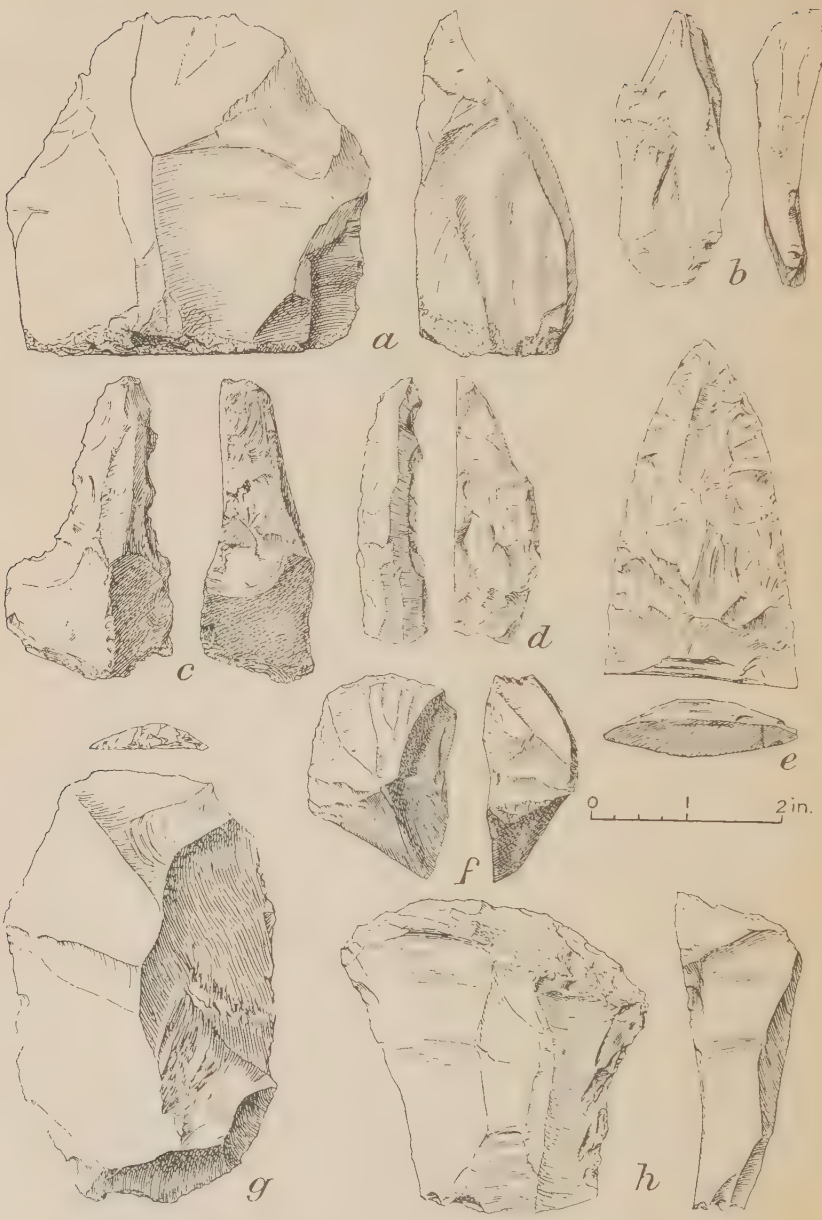


Fig. 71.—Flint implements from pits, Grime's Graves. ($\frac{1}{2}$)

lay on the ancient spoil-heaps, and various shades of blue show the gradual change from black to white, in inverse proportion to the depth below the surface. The series of flints exhibited in Case R has been fully published, and only a few specimens can be noticed here, without regard to their relative ages, the latest view of Grime's Graves being that mining went on through several periods. The point of most interest is to determine the beginning of the industry, and not only do many of the types suggest an early stage in the palaeolithic Cave-period, but the Le Moustier series from High Lodge (9 miles to the south) must be due to a local outcrop of flint or to mining in the vicinity; and the Abbé Breuil

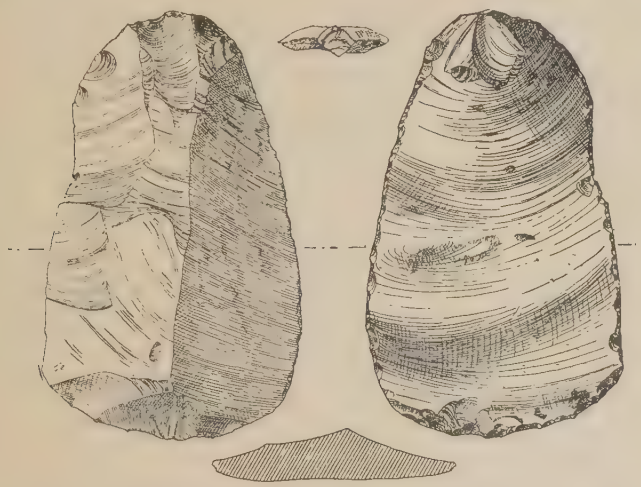


Fig. 72.—Flint implement from 'floor', Grime's Graves. ($\frac{1}{3}$)

has been quoted as saying that it would have been impossible to produce good implements of the Lower and Upper Palaeolithic by the use of simple pebbles, so that it must be admitted that flint-mining had already begun.

According to the text-books the hand-axe became extinct in the Aurignac period, but fig. 76, *a*, can hardly be described otherwise. One of the principal types manufactured at the Graves was the Levallois flake with facetted butt (fig. 71, *g*), and a fine specimen found and presented by Dr. Peake (fig. 72) has a small dressed platform. Square cores flaked in alternate directions on the two faces are common (fig. 73), and have been found in a Belgian deposit of Le Moustier date, nor can such a date be denied to the small square side-scraper with facetted butt (fig. 74), which has dozens of parallels in St. Brelade Cave, Jersey (p. 125). Fig. 71, *e*, though incomplete, is one of the best worked pieces from the

Graves, but its original outline is uncertain. The triangular implement (fig. 75) with the outline of a Le Moustier 'point' but with a sharp edge at the butt is ridged near the longitudinal axis. The right angle and curve at the ends of the lower edge are intentional and of frequent occurrence, characterizing the 'proto-celt' or rudimentary axe developed in neolithic times. Fig. 71, *b*. is a

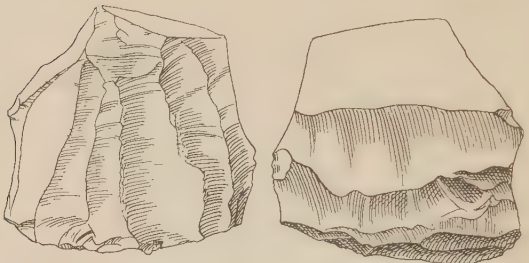


Fig. 73.—Core flaked alternately, Grime's Graves. ($\frac{1}{3}$)

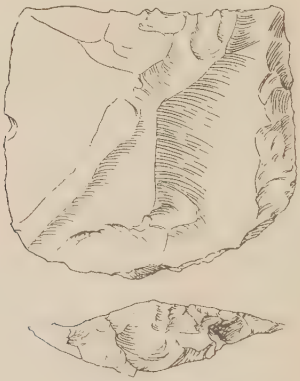


Fig. 74.—Square flake, facetted, Grime's Graves. ($\frac{2}{3}$)

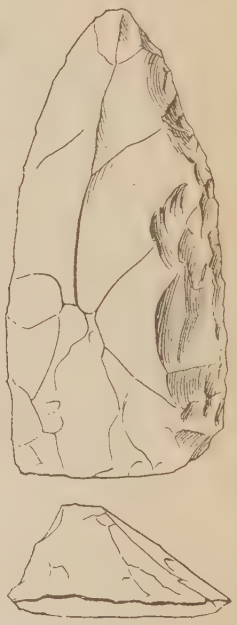


Fig. 75.—Celt-like implement, Grime's Graves. ($\frac{2}{3}$)

coarse graver, and the heavy scraper (*h*) has a broad curved end, but is neither an end-scraper nor side-scraper in the usual sense. A steep fluted plane (*f*) may be compared with fig. 137, and prismatic tools (*d*) are sometimes furnished with a handle or wings (*c*). Typical too are segmental tools (like a 'tea-cosy'), which have in some cases one flat face, as in fig. 71, *a*: the base is flat, enabling this implement to stand upright, and often bears the original crust, showing it has not been broken off a larger implement. A hinge-fracture (p. 5) is sometimes found below one

of the faces, and occasionally the rounded edge is imitated by battering, perhaps to facilitate handling. Another common type (fig. 76, *b*) has parallel sides and one convex face, with the end dressed as if for use as a scraper: these also are complete tools, not fragments of Thames picks, &c. Attention should further be called to the large block of flint from Pit 2, which resembles the tortoise-cores in Case S (fig. 21), but is unstruck, the final blow to detach the flake implement not having been delivered as the preparation of the upper face revealed a large cavity in the flint. The huge side-scraper with the appearance of a chopper (from Floor 4) has one face of the edge quite plain, and in this respect is more typical of Le Moustier than the choppers from the type-station in Case 105.

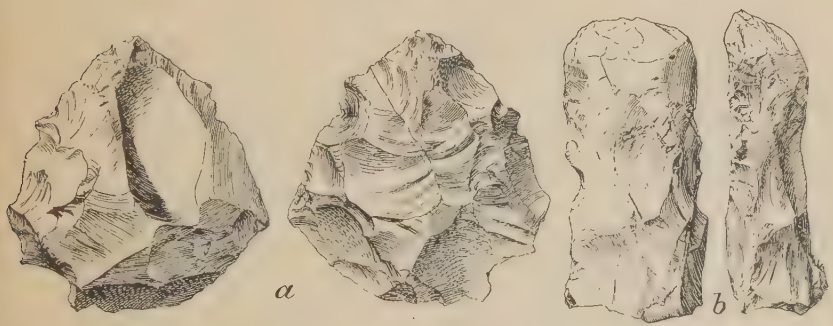


Fig. 76.—Two flint implements, Grime's Graves. ($\frac{1}{3}$)

Many of the types on exhibition recall those of the early Cave-period, especially the Levallois series, which is now referred by some authorities not to Le Moustier but St. Acheul II. Later forms, however (gravers, conical planes, &c.), are present, and the general roughness of the technique finds a parallel in the transition culture of Abri Audi (p. 128), whereas the latest palaeolithic forms are conspicuous by their absence, unless the style of the engravings be accepted as La Madeleine. Grime's Graves are certainly not neolithic if polish and arrow-heads constitute the hall-mark of that culture, though the fauna and flora of the filling-in period do not harmonize with those of the Cave-period, and no extinct animals have yet been found on the site. In spite of several cave-finds in Belgium, pottery is generally held to be not earlier than neolithic, and several fragments of a soft pinkish-buff ware have been found in the lower filling of the pits, contrasting with the Hallstatt sherds from superficial excavations. Neolithic man would naturally be attracted to the site by the obvious signs of earlier workings, and take advantage of the waste material, even if he did not sink fresh

shafts or lengthen the galleries of those he found accessible. Such continuity has been proved at Spiennes and Grand Pressigny.

Much less work has been done at Cissbury, though most collectors have surface finds from the hill and the 'camp' on its summit. A selection of specimens from the excavations of 1867–8 and 1874–5 (given by Mr. E. H. Willett) is exhibited in Case R with a chalk lamp (fig. 77) for use in the mine-galleries, remarkably like that from La Ferrassie, a rock-shelter of the Aurignac period near Les Eyzies. Two shoulder-blades of the ox (*scapulae* of *Bos longifrons*, now recognized as a Pleistocene as well as neolithic species) were possibly used by the miners as shovels, and there are besides deer-antler picks, several wedges and

Fig. 77.—Chalk lamp, Cissbury, Sussex. ($\frac{1}{2}$)

Fig. 78.—Unpolished celt, Cissbury. ($\frac{1}{4}$)

punches probably used for detaching blocks of chalk. Of the large number of flint implements only one (an imperfect celt) shows any sign of grinding. Some roughly shaped blocks look like implements in the making, and the leading type (the Cissbury celt) is a long oval with cutting-edge all round and convex faces (fig. 78). Some resemble the so-called chisels of the Dolmen period (pl. VI), but a few bear a striking resemblance to the palaeolithic hand-axe or *coup-de-poing* (fig. 79). A long slug-like implement (fig. 80) is steeply fluted at the end as if for use as a plane, though the under face is not flat: the form is peculiar but not unprecedented, and may be compared with an ochreous specimen from Boscombe in Case 67 (p. 93), and another from Canterbury (Case T). Like many others in Case R, the Cissbury flints are patinated white, but many Bronze Age arrow-heads have undergone the same superficial change, and an alkaline solution is known to hasten the process. The fragment of buff pottery found 18 ft. from the surface is similar to fragments from the lower levels of the Grime's Graves pits already mentioned (p. 85).

There is no reason to assume more than one date for the series

from Peppard, on the Chilterns above Henley, but the period is anything but certain, and the accompanying fauna indecisive. They were excavated and described by Dr. A. E. Peake before the work began at Grime's Graves, and the first traces of the deposit came to light in 1912, two saucer-shaped depressions on the flank of a valley in the chalk giving a clue to the main positions, close to Peppard Common. On the flat the level is 324 ft. O.D., and the subsoil is plateau-gravel, which has yielded palaeolithic implements; but there is hill-wash on the slopes 1–2½ ft. thick, covering alternate bands of flint and clay in two adjacent but distinct excavations in the upper, flint-bearing chalk. One pit measured at the mouth 65 ft. by 50 ft., and was opened to a depth of 13½ ft.

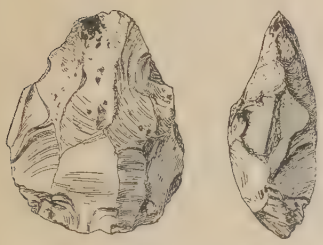


Fig. 79.—Flint hand-axe, Cissbury. (⅓)

Fig. 80.—Flint plane, Cissbury. (⅓)

over part of the area: the other was the same length, but 15 ft. narrower, and on the average 3½ ft. deep, with pockets into the chalk to reach a flint seam. The layers of moved and manufactured flints had no matrix except at the feather-edges, though clay and flakes were immediately above these layers; and nearly all the 'factory' pieces were a dead white, with shades of blue, the stone being of poor quality, with cherty inclusions and cavities with calcite crystals. A peculiarity of the flint from the second pit is a black lustrous band of varying width beneath the crust, which does not change colour with the rest of the chipped surface. Iron staining is common throughout and must be due to pyrites, as the plough never touched the lower layers; and there are many cases of 'gloss', in patches, specks and detached lines, as at Savernake (p. 59). Thousands of flints were excavated, but there was no sign of grinding or polishing, no borers and no arrow-heads; and the abundance of flakes with facetted butts (striking-platforms) and of 'tortoise'-cores from which such flake-implements were struck, is an interesting link with Grime's Graves.

All the specimens illustrated in the original report were presented to the Museum, and are exhibited in Case S, six being reproduced as perhaps the most striking of the series. Here again

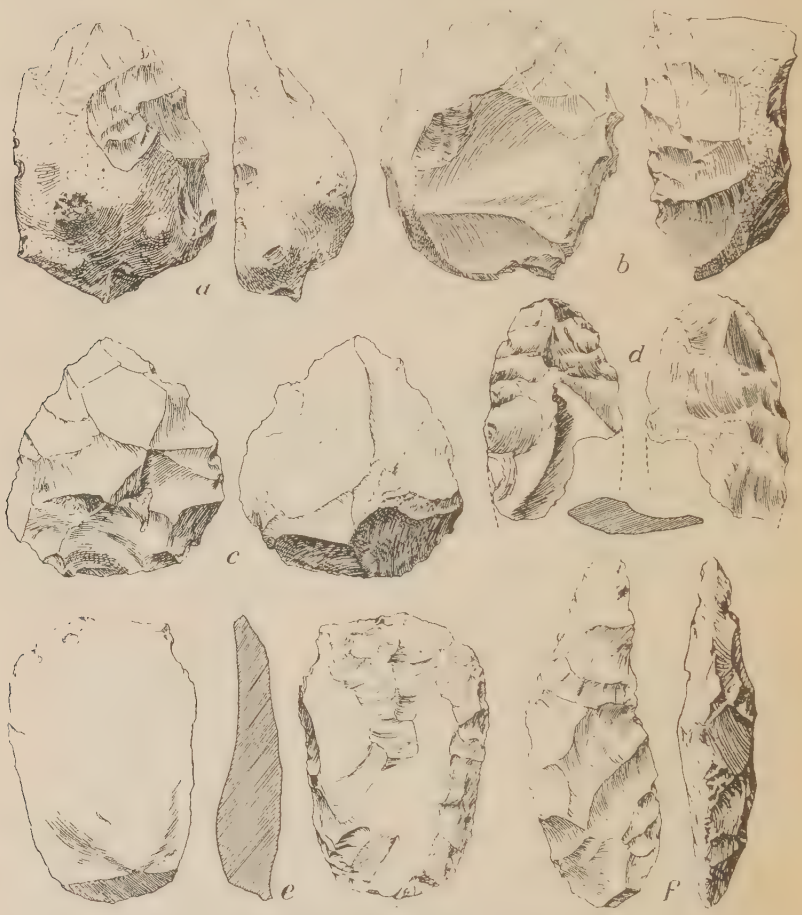


Fig. 81.—Flint implements, Peppard, Oxon. ($\frac{1}{3}$)

the hand-axe idea is prevalent, two faces being illustrated in fig. 81, *c*: the cordate type is recognized as the last form of that palaeolithic implement. A flake implement (*e*) recalling the Northfleet type, but with flat (not facetted) striking-platform (below), is still more in accordance with the Frindsbury series (p. 41). An approach to Solutré is seen in the imperfect leaf-shaped

blade (*d*), whereas the twisted celt-like implement (*f*) is more suggestive of neolithic times, the type occurring also at Grime's Graves (Case R). An implement with one flat face and much crust on the convex part (*a*) is also characteristic of the site, and would serve the purpose of a hand-axe, while the steeply-chipped disk (*b*) may have been used as a plane, though the engrailed edge would be detrimental. All the worked flints are quite unrolled, and the presence of many quartzite hammer-stones confirms the view that this was a workshop-site.

One of the greatest problems in Prehistory is the occurrence of minute flint implements, made to pattern, in many isolated parts of the world. Their dimensions and workmanship might easily be considered proof of a specialized industry—a peculiar technique required for some local and transient purpose; but these pygmy implements are not only distributed over three continents, but were produced during several consecutive periods of the Stone

Fig. 82.—Group of pygmy implements, Marsden, Yorks. ($\frac{1}{1}$)

Age, perhaps also after the introduction of metal. The industry is generally named after Tardenois (La Fère-en-Tardenois, 23 miles west of Reims) and assigned by some to the close of the Palaeolithic, by others to the early neolithic period; but the beginnings of this diminutive industry can be traced back at least to Aurignac times, and a gradual reduction in the size of blades or points with battered backs (*à dos abattu*) is noticed during the later phases of the Upper Palaeolithic (figs. 66, 144). Their purpose is as difficult to explain as the manufacture of identical forms in such distant localities as Britain, Poland, and India; and the theory that they were used in fishing, or inserted in grooves along harpoon-heads (as fig. 169), does not explain why so much delicate work was lavished on flints that might be lost the first time they were used. An interesting discovery has been made by Mr. Francis Buckley of a series of thirty-five such implements, all of one pattern (fig. 82), arranged in a line at intervals of $1\frac{1}{2}$–2 in. under an inch of sand and below 6 in. of peat on White Hill, close to the watershed of the southern Pennines. The suggestion is that they were the teeth of a saw or the barbs of a large harpoon, set originally in a grooved piece of wood, of which no trace remained; and the discovery does not favour the theory that pygmy implements

of this and other types were used for tattooing, nor indeed that they were fixed close together in a board or frame (like a carding-comb) for severing the fibres on the fleshy side of a skin to render it supple for use as clothing.

The type-series in this museum (Case T) and at Huddersfield have been given by Mr. Buckley, whose researches on the Pennine range and in Northumberland have thrown much light on the sequence of forms and their relation to recognized continental industries. He distinguishes (i) a *narrow* blade industry, related in some way to Mas d'Azil—the earlier sites yielding angle gravers (p. 131), and the later characterized by micro-gravers or pygmy-gravers; and (ii) a *broad* blade industry, nearly identical with the early Tardenois of Belgium—the early sites with the angle-graver or true graver, and the later with the micro-graver as

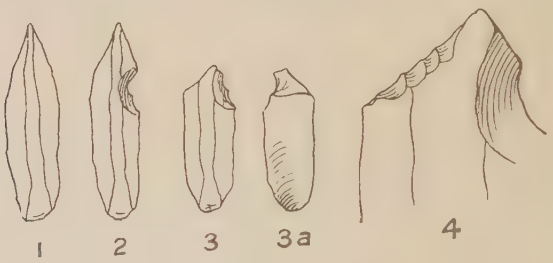


*Fig. 83.—Manufacture of pygmy graver (no. 4 enlarged).

the typical implement. On the hills of West Yorkshire the general development of both industries is from blade to triangle, and from triangle to trapeze (four-sided with two sides parallel) or pen-knife form; and it is possible that all stages of both industries in this district are really associated with small beaked tools (as fig. 83), otherwise known as pygmy-gravers. This type has been described as a small blade (1) notched by pressure at the top right-hand shoulder, the distinctive beak being thus formed at the apex (2). The blade is then turned over, and a flake removed obliquely by pressure from behind the beak, shearing away part of the opposite edge and producing in its place a finer and straighter cutting-edge (3). The marks of usage (4) invariably appear along this attenuated edge, immediately opposite the notch, which possibly served as a rest for the finger in use, to allow pressure to be exerted behind the cutting-edge. The implement, however, is so small and fragile that pressure must have been reduced to a minimum: in spite of these drawbacks there was evidently a considerable demand for the type here and abroad at the end of the palaeolithic period.

On the coast of Northumberland (Budle Bay and Craster) not only the early phase, but a late Tardenois culture has been recognized, and contact with Belgium at that time becomes a possibility. The earlier Pennine series may be a local development of some industry of the Cave-period, the pointed pygmy implements being nearer to the Aurignac than to the Mas d'Azil group. La Madeleine, which should intervene, is poorly represented in Britain (p. 72), but at Campbeltown, Kintyre, in contrast to the Mas d'Azil discoveries of Oban, a series has been found with the appearance of debased La Madeleine, and may be regarded as a local culture previous to the arrival of the Mas d'Azil style from the Continent, or the broad blades from Belgium. In any case, the Pennine workshops were always of small extent, indicating a transitory occupation by hunting people, always above the 1,000 ft. contour, for choice on dry and isolated knolls with sandy subsoil, the coarse grit rock being avoided as well as the highest hills of the

Fig. 84.—Pygmy flint implements, E. Lancashire. $(\frac{1}{1})$

district. Normally the flints are found on or just in the grey sand (disintegrated sandstone) under a varying thickness of peat; and as there is no local supply of flint except the glacial drift, it is presumed that the good brown flint was imported as well as the grey variety, which came from the Wolds.

Diagrams of the leading types are given in fig. 84, the triangle being regarded as the earlier and the crescent being derived from it. The scalene triangle (nos. 2, 3, 5) is the commonest in Britain, and the trapeze (fig. 214, no. 2) and rhomboid probably the latest, Horsham (Sussex) being their best known site. With pygmies are often associated small circular steep-edged scrapers (the so-called 'thumb' scrapers), the average diameter being that of a sixpenny piece.

Scunthorpe, a sandy locality in Lincolnshire, has so far produced the finest series in Britain, but examples are also shown from East Lancashire, Enstone (Oxfordshire), and Sevenoaks (Kent), besides those already mentioned. At Hastings the shell-mounds on Castle Hill, about 170 ft. above the sea, have been explored by Mr. Lewis Abbott, who distinguishes three groups—ordinary neolithic forms in quantity; a large series of worked flakes; and highly specialized diminutive forms or microliths like fig. 84.

It seems clear that fishermen's huts stood on the site both in neolithic and medieval times, but the pygmy implements are typical of the Tardenois culture, and so far as their situation is concerned correspond to the Northumberland series.

Though the transition from palaeolithic to neolithic culture is not so obscure as it was, there is still little light on the condition of the British Isles between about 10,000 B. C. (a date often quoted as the end of glacial conditions, according to de Geer's researches in Sweden) and the Shell-mound period (about 5000 - 4000 B. C.), when the industry of Le Campigny is supposed to have flourished, to be soon followed by the Megalithic period (the Age of great stone monuments) and the polishing of flint implements. The gap is partly filled in France and Scandinavia by the

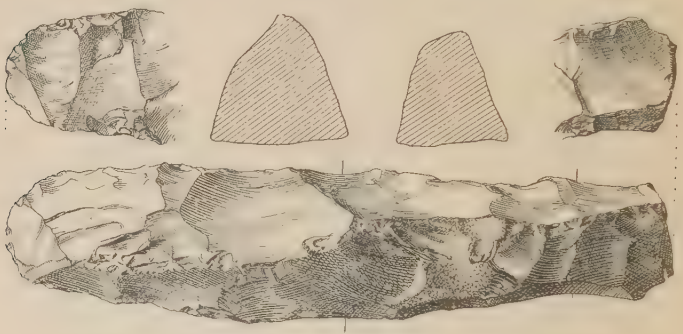


Fig. 85.—'Thames pick' with details, Thames. ($\frac{1}{3}$)

Maglemose or Epipalaeolithic culture (p. 18), and this has been recognized in Holderness (two harpoon-heads of bone); but most students would include the flint-mines and local industries of Grime's Graves and Cissbury, in which the leading types of Le Campigny—the flint 'pick' and Shell-mound axe or *grand tranchet*—are, however, entirely wanting. While the latter tool is remarkably scarce in Britain, 'picks' on the other hand are abundant, and require a few words of explanation. Generally known as 'Thames picks', as they are frequently dredged from the river, they are also common on the surface of the Downs and elsewhere in the chalk area, where nodules of the requisite size could be procured; and the name was chosen to correspond to the French *pic*. The majority are, however, rather adzes than picks, not being pointed at the end but given a chisel-edge by a transverse blow on one or both faces (fig. 85, left), though this might have been merely a method of re-sharpening implements originally flaked longitudinally, as refuse-flakes from Lower Halstow suggest. It is possible that they were used for hollowing out canoes after

burning the interior of a tree-trunk, a well-known practice among savages of the present day. These implements come, according to Dr. Frank Corner, from the top of the ballast, just below the three beds of peat which have been proved in the bed of the lower Thames; and the inference is that they were made and lost in the river after the sunk channel was filled up again with gravel, and the land was somewhat higher than at present—perhaps during the period of the forests that are now submerged round our coasts. But there is some evidence that the use of flint bars began much earlier in Britain; for instance the late Mr. R. W. Hooley found one at the base of 2 ft. of undisturbed brick-earth in the cliff at 80–90 ft. O.D., half a mile west of Chilton Chine, Isle of Wight; and Dr. Longstaff, after careful inquiry, is convinced that a related form in Case 67 came from the sand below the gravel on the cliff at Boscombe, near Bournemouth, just the level of a large number of local hand-axes. In view of this persistence, the type may belong, like the 'pygmies', to a very limited group which defied the changes of fashion and ministered to some permanent need of primitive man.

The two natural formations just mentioned, peat and the submerged forests, might be expected to assist in estimating the duration of the neolithic period; but at present the evidence from either is scanty and ambiguous. As the forests growing near the sea were inundated by a 50 ft. or 60 ft. depression of our southern coast and have remained below high-water ever since, it is difficult to recover any human relics that were without doubt contemporary with their growth. The circular mace-head found 20 ft. deep on peat under estuarine mud at Southampton Docks cannot well be earlier than the Megalithic period (p. 157), and a similar late date (Dolmen period) must be assigned to a flint celt from the submerged forest at Hunstanton, Norfolk, on account of its thin butt, convex faces, and squared sides (p. 158). The late Mr. Clement Reid held that submergence in the south at that time involved a rise of the land in Scotland, with the pivot at Flamborough Head, much as Scandinavia oscillated about the Nissum-Falster line.

Some of the palaeolithic animals had become extinct before the neolithic period began, others had migrated to the north, the south, or to mountainous regions; but the majority of the species survived, and it is now generally held that there was no actual break but a gradual improvement of conditions due to the rise of temperature and disappearance of the ice. Some authorities use the term Epipalaeolithic to denote a culture which grew out of the Upper Palaeolithic, but this tends to make Neolithic merely the Age of polished stone, a meaning that is unjustifiably restricted. Mention has already been made (p. 92) of the two implements which are accepted as characteristic of the period

of Le Campigny in the Shell-mounds of Denmark—the *pic* (known as the Thames pick in England (fig. 85) which is abundant here, and the *grand tranchet* or Shell-mound axe (fig. 170), which is unaccountably rare in this country. A sketch of this culture is given elsewhere (p. 155), and though the dog was domesticated, pottery invented, and grinding-stones used for mealing grain, there are reasons for believing that agriculture and the domestication of other animals came later, being perhaps introduced with the dolmen-idea (p. 95) by coastal traders in touch with the Mediterranean and the Near East. The date would in that case be 3000–2000 B.C.

It has been frequently stated on authority that the hand-axe did not survive the Aurignac period, so that there was a gap between its use and the adoption of the neolithic celt, though a connecting link has been suggested (p. 45). The term 'celt' as applied to bronze dates back at least to 1740 (Stukeley's *Stonehenge*) ; and denotes an axe-head of stone or metal with cutting-edge at the broader end. The derivation is from an imaginary Latin word *celtis*, due to a misreading of the Vulgate version of Job xix. 24 ; and it may be added that there is no connexion with the people called Celts or Kelts. This implement was always intended to be hafted, the wooden handle being applied in various ways. The collection contains specimens with the original hafts complete from Ehenside Tarn, Cumberland (Case R), Solway Moss (Case A), and the lake-dwellings of Switzerland (Case F). The method adopted in all these examples was not that commonly preferred by savage tribes, viz., lashing the blade to the short limb of a pick-shaped handle in the manner illustrated by several examples shown in a frame on the wall adjoining Case 152. The procedure was to cut a transverse hole fitting the butt of the stone blade in a straight haft, the upper end of which was left thick enough for the purpose. The objection to this method is that the force of repeated blows is liable to split the wood, though, as will be seen from the Swiss examples, the lake-dwellers had invented a device which obviated this disadvantage. They fixed the blade in a socket of deer-horn (fig. 189), the elasticity of which minimized the effect of the blows upon the wood.

It must be remembered that in speaking of the Neolithic Age, we do not imply a civilization uniform in all parts of the world. There are differences in the style of neolithic objects even within the limits of Europe, nor can we assume that customs and beliefs were everywhere the same. The men who brought the new arts into Europe probably belonged to various tribes and issued from centres in which the habits of life were dissimilar. As a single instance of such divergence, it may be mentioned that in Finistère, Marne, Aisne, and the neighbourhood of Paris incinerations are met with in dolmens and other megalithic tombs

whereas in Scandinavia and generally in Britain the body in such cases is buried unburnt.

It is now often held that the idea of building dolmens spread by sea along the Mediterranean and Atlantic coasts to Britain and the Baltic, together with the elements of agriculture, cattle-breeding and flint-polishing, from some common centre, which is generally fixed in the Near East, Syria being the early home of cereals; but the Peninsula seems to have been a secondary centre in the West, and some authorities insist that dolmens as well as many other customs and institutions emanated from Egypt and traversed immense distances in all directions. The advance towards civilization has always been extremely uneven, favoured districts, such as the great river-valleys, outstripping those which are less advantageously situated. For the same reason the Stone Age came to an end far earlier in some parts of the world than others. While in ancient Egypt copper was already in use before 5000 B.C., stone tools were still employed in Great Britain and Northern Europe some three thousand years later. The conversion of the world from the use of stone to that of metal has been proceeding in more remote lands ever since; but in most cases it will never be known when the change actually took place. Even in our own time there are outlying districts where metal is a novelty, though modern commerce is rapidly reducing their number.

In glazed cupboards at the end of Table-cases D, E, and G are models of selected dolmens in Wales and Cornwall, typical of this kind of megalithic tomb, which is found generally near the coast in a long line from India to south Sweden by way of the Mediterranean, the Atlantic coast of Portugal and France, and the English Channel. There are local variations, but the same general form has been found in most of the countries bordering this sea-route, and the problem is to decide in which direction the type travelled, though Portugal is now held to have been the centre from which the practice spread to the west and north of Europe.

It may be added that the term 'dolmen' (table-stone) is best used for structures consisting of a large cap-stone supported on upright stones, usually three or four, and it is understood in this sense on the Continent, where 'cromlech' signifies a stone-circle, or ring of standing stones, such as Arbor Low, of which a model is shown. The stones are now fallen, but were most probably upright originally, and if isolated would be called menhirs; and their date is suggested by the discovery of flint implements (boards in Case 74) during excavations in 1901–2, and by the fact that a Bronze Age round-barrow has encroached on the fosse which surrounds the stone circle. Arbor Low belongs to the same type as Avebury, Wilts., and both are probably earlier than Stonehenge

(see model adjoining), which may possibly be dated and explained by the excavations now in progress.

In Cases 8–11 are slabs of stone with markings of unknown meaning, but probably of the neolithic period. The simplest are cup-markings like those scattered over the stone from Carbrach (Aberdeenshire), which are about $1\frac{1}{2}$ in. in diameter with a uniform depth of $\frac{1}{2}$ in. More elaborate examples come from Lilburn Tower (Northumberland) with concentric rings cut about three-tenths of an inch deep; and from Black Heddon, Stamfordham, in the same county, with concentric rings surrounding a pit, usually known as cup-and-ring markings. These are sometimes connected by channels and are specially common in the British Isles, while the simpler cup-markings are found in many parts of Europe, above all in the dolmen area, in Palestine, North Africa, and India. They have had a ceremonial or religious significance since the neolithic period, and are found even on the walls of churches. That some are contemporary with the megalithic tombs, on the stones of which they are frequently found, has been indicated by their occurrence in positions not easily accessible, as on the inner walls of passage-graves; but they were no doubt largely produced also in the Bronze Age. On a slab from a cist containing an unburnt body and an urn at Harbottle Peels in Coquetdale (Northumberland) is engraved a figure suggesting the outline of the sole of a foot, 6 in. long; and it may be noted that feet in pairs are represented on rock-faces in Bohuslän, Sweden, along with the more usual boats, men and sun-symbols. The last take the form of a dot and concentric rings, or of a cross within a circle, such as occur on sepulchral pottery and gold disks of the Bronze Age in the British Isles (*Bronze Age Guide*, pp. 77, 111).

Next in order come the sepulchral chambers of more elaborate plan than the dolmen, entirely concealed (or with the largest cap-stone only showing) under the higher and broader end of an oval mound of earth called a long-barrow, in contrast to the round barrows of the Bronze Age. Generally with the long axis east-and-west and the chamber and entrance both at the east end, they are more plentiful in the south-western counties of England than in the north, and inhumation is the rule, at least for the primary burials, though there are cases of cremation in Wiltshire, and some peculiar long barrows in Yorkshire contained bodies grouped in the furnaces where they were burnt. When the body is buried unburnt, the bones are often disjointed, as if the skeleton had been placed in the mound after the flesh had decayed. In connexion with this peculiarity it may be noted that in Tahiti the interment of the bones of the dead only took place after the complete decay of the flesh, and in other parts of the savage world a long interval is allowed to elapse between death and burial. Something of the same kind may have occurred in Spain during the Bronze Age, as

in that country two skeletons have been found in a single urn which would not have contained the bodies of two persons buried shortly after death. As the chamber of a long-barrow was opened from time to time, and previous occupants disturbed to make room for others, it is rare to find any articles in association, and for this reason there is but little in the collection to represent this type of interment, but the contemporary pottery has now been recognized and certain patterns of the arrow-head can be assigned to this period. Three complete bowls on the right of Case 74 are enough to fix the leading type, which is of brown or blackish ware with little grit, baked fairly hard, with a rounded base, a hollow moulding between the lip and shoulder, and impressions of cord (frequently producing a 'maggot' pattern) or the finger-nail inside and outside the lip and on the upper part of the body

Fig. 86.—Neolithic pottery bowl, Thames at Mortlake. ($\frac{1}{4}$)

in horizontal bands. This seems to be the prototype of the Bronze Age 'food-vessel', which was a purely native production.

The physical character of the long-barrow skeletons differs from those of the round-barrows of the Bronze Age; the former are invariably long-headed, while the latter are generally round-headed, though long skulls sometimes occur. By way of explanation it may be added that skulls are classified by measurement, the length being represented by 100, and the breadth regarded as a percentage of the length. Most skulls vary in breadth between 70 and 85, and within these limits three classes have been established. Those between 70 and 75 are called *dolichocephalic* (long-headed); between 75 and 80 *mesaticephalic* (medium-headed); and those between 80 and 85 *brachycephalic* (short-headed).

The horned cairns of Scotland, the *allées couvertes* (roofed passages) of France, the *Hunnebedden* (giants' graves) of Holland, and similar structures in Scandinavia (p. 158) and Portugal confirm the view that this kind of tomb was developed from the dolmen which is found approximately in the same districts.

Besides the complete bowls from the Thames at Mortlake (max. diameter, 6·9 in.), Hedsor (6·85 in.), and Mongewell near Wallingford (11·5 in.), all with the lower part plain and rounded (fig. 86),

there are fragments in Case 74 from neolithic pit-dwellings at Wisley (Surrey), and still better from the chambered long-barrow (figs. 87, 88), near Avebury, excavated and described by Dr. Thurnam in 1860. It was then 336 ft. long, 40 ft. wide at the west end, and 75 ft. at the east, which was also the higher end (about 8 ft.). The stones projecting from and scattered over the mound, being the remains of the sepulchral chamber, were all within 60 ft. from the eastern end, but there was originally a line of upright sarsen-stones all round the foot of the barrow, the spaces between the slabs being filled with dry-walling in horizontal courses (figs. 89–91). The chamber and gallery had been originally roofed with stone slabs, some of which were found in position and weighed about a ton each. In the chalk rubble within were found four skeletons

Fig. 87.—Neolithic pottery, West Kennet long-barrow. ($\frac{5}{7}$)

Fig. 88.—Neolithic pottery, West Kennet long-barrow. ($\frac{5}{7}$)

with long skulls, probably the original interments, but others were found with what seems to be later pottery, and the tomb had no doubt been reopened from time to time. Nearly 300 flint flakes were collected, some being finished tools and most of them milky white; while the sherds were in three separate heaps, but very few pieces of the same vessel were found, and it was clear that the fragments had been subsequently collected. This disturbance of the sepulchral deposits may date from the Roman period, when the chamber seems to have been entered, if not used for burial purposes. The absence of any signs of cremation or bronze confirms the view that the original burials belong to the neolithic period, and a date is thus afforded for the pottery, the rest of which is in Devizes Museum. The excavation of prehistoric pits at Peterborough by Mr. Wyman Abbott proves that this type preceded,

and perhaps overlapped to some extent, the beakers of the earliest Bronze Age (*Bronze Age Guide*, p. 66), which from this and other finds in Haddingtonshire are now known to have been domestic as well as sepulchral vessels.

Long-barrows are comparatively rare, those in North Wilts. and

Fig. 89.—Long-barrow restored, from the south, West Kennet.

Fig. 90.—View along passage into chamber, West Kennet.

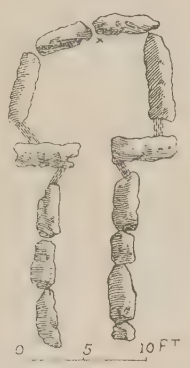


Fig. 91.—Plan of chamber in long-barrow, West Kennet.

Gloucestershire being the best examples of the chambered type, and the unchambered occurring especially in South Wilts., Dorset, Westmorland, and Yorks. Among the objects known to have been derived from primary interments in long-barrows, the following may be specially mentioned: four flint arrow- or javelin-heads of remarkably fine workmanship from Winterbourne Stoke Down, and flint arrow-heads from Fyfield and Walker Hill in Wiltshire. These blades are very thin and either kite-shaped

or pointed oval (fig. 92); but many less skilfully made have been found on the surface, especially in Derbyshire and on the Yorkshire Wolds (Case 73). They are said to be rare in the south, but many have been found in Suffolk, and an interesting series, all patinated white, comes from North Oxfordshire (collected by

Fig. 92.—Varieties of the neolithic arrow-head. ($\frac{1}{2}$)

Mr. R. W. Wilson, drawer in Case T), the same locality producing also the Bronze Age type with barbs and tang, equally patinated. At present the neolithic sequence is rather uncertain, and at Arbor Low (model of stone circle or cromlech in Prehistoric Room) some were found above barbed and tanged specimens theoretically later. The transverse arrow-head (fig. 93) goes back to the Shell-mound period (p. 156), but is rare in England outside the Icklingham area.

Fig. 93.—Transverse arrow-head, Speeton, Yorks. ($\frac{1}{1}$)

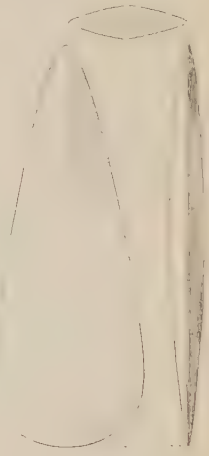


Fig. 94.—Jadeite celt, Canterbury. ($\frac{1}{4}$)

The polishing of stone implements is among the arts supposed to have been introduced with the dolmen idea. It was no doubt practised on semi-precious stones in the eastern Mediterranean, like the small celts from the Greek islands and Asia Minor in Case 143 and the fine jadeite example of Brittany type from Canterbury in Case T (fig. 94), but in the North it was a necessity rather than a luxury, as in districts devoid of flint greenstone was used for axes and could only be shaped by grinding. A Scandina-

vian example is the Nöstvet type (Case 132), but in England also greenstone and basalt axes are common in the East Riding of Yorkshire and in the Thames valley. The term covers several varieties of rock, some of which weather easily and have now a rough surface after losing the polished layer, which flakes off like a veneer. Many specimens of this material have a pointed butt, a curved cutting-edge and an oval or almost circular section, all indications of a pre-dolmen date (fig. 95). The gradual flattening of the faces gives breadth to the butt, and with improved technique

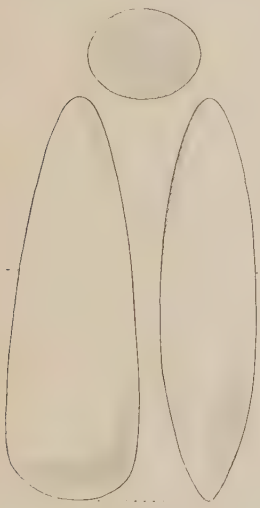


Fig. 95.—Stone celt with pointed butt, Thames at Wandsworth. ($\frac{1}{4}$)

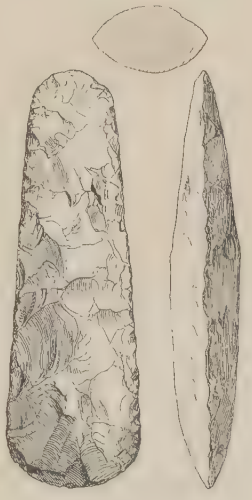


Fig. 96.—Thin-butted celt of flint, Hitcham, Bucks. ($\frac{1}{4}$)

the butt becomes thinner (almost a second cutting-edge), and flint is now the material usually employed. At the time of the dolmens the celt has a pointed oval section, a thin butt and a cutting-edge much less curved than before (fig. 96). A variety that seems to be peculiar to certain parts of England (Thames and East Anglia) is very thick along the middle line, the section approaching a lozenge (fig. 97), and well-chipped examples from the Isle of Wight, Mildenhall, and Great Bealings, Suffolk, were no doubt intended to be polished. A further development on both sides of the North Sea was the flattening of the sides by grinding, the result being almost an oblong section.

At this stage parallelism with Scandinavia ceased and the only subsequent change in this country seems to have been an increase of size, especially in North-west England (Cumbria) where the

local felstone was a favourite material. Besides those in Case T, the longest of which measures $14\frac{1}{2}$ in., there is a series in the lower part of Case R found in draining a small lake called Ehenside (or Gibb) Tarn near St. Bees, Cumberland. They were discovered by Mr. R. D. Darbishire and others in the vegetable layers which had formed in the bed of the tarn, and are of special interest from the fact that so many of the objects are of wood, and have been preserved by the moisture from decay. Stone axes with their hafts complete, such as the one here exhibited, are of extreme rarity (see also cast in Table-case A). A curious paddle-shaped object of oak with three prongs, a small paddle, the pierced oak haft of an axe,

Fig. 97.—Polished flint celt, Teddington. $(\frac{1}{4})$

and a mallet are exhibited with casts of other wooden objects discovered at Ehenside, but most of these are not in the Museum—viz. a remarkable curved implement or weapon shaped like a Cupid's bow, a paddle-shaped club, and an object with a flat rectangular head, which may be a club or an unfinished axe-haft, the hole intended to receive the stone head not having been bored: the broken original of this object is preserved in water on the bracket below. Of the six axe-heads of felstone or other pale green stone, three completely ground, some are of remarkable size and weight (fig. 98). A ground stone axe-head adjoins the original beechwood haft in the glass bottle, and in another is the original club or unfinished axe-haft, of which a cast is exhibited above. The block of stone used for grinding stone axe-heads may be compared with one from Oxfordshire (fig. 99) and others from Denmark at the north end of Case J.

The Scandinavian finds are abundant, but opportunities for checking the system outlined above by British groups are of rare

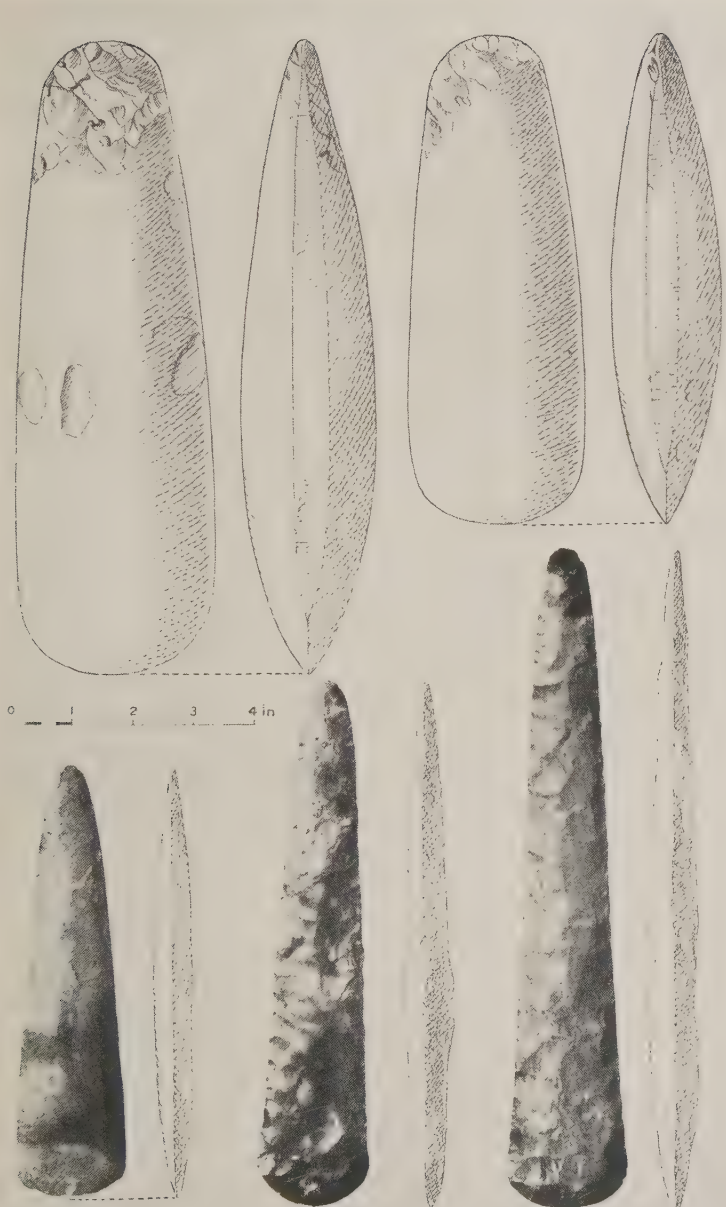


PLATE VI.—FLINTS FOUND TOGETHER AT BEXLEY HEATH, KENT.
(Case T, *see* p. 103)

occurrence. All the more important therefore are the two cases of association here illustrated. The first comprises five flints (pl. VI) given by Mr. Algernon A. Hankey, which were found in 1883 when a trench 3–4 ft. deep was being dug in a garden at Upton, in the parish of Bexley Heath, Kent; they had evidently been buried together before being used, and perhaps before being finished, as the smallest 'chisel' (really a narrow celt) is polished all over

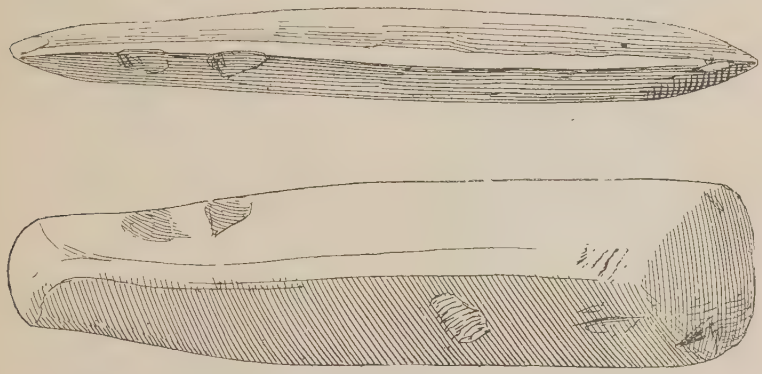


Fig. 98.—Thin-butted celt of felstone, Ehenside Tarn. ($\frac{1}{3}$)

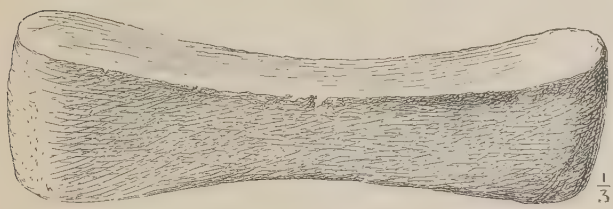


Fig. 99.—Grinding stone, Dorchester, Oxon. ($\frac{1}{3}$)

while the other two are only chipped, not rendered smooth by grinding. The workmanship is excellent, and the date is given by the two large thin-butted and square-sided celts which are of the type connected with the dolmens, at least in Scandinavia. As often elsewhere in Britain these two celts are white or greyish, and were perhaps made of Lincolnshire flint brought south by glacial action or later by man himself; but this quality was not used exclusively, as the collection contains brown and black examples of exactly the same type from the Thames, besides a brown one from Mildenhall, Suffolk. The 'chisels' may be an exaggerated form of the Cissbury celt, which can be recognized

with certain other forms as a neolithic element on that prolific site.

The other group is from a burial, as the objects illustrated (fig. 100) were found with a few human bones and minor details under a slab in a limestone cairn, within what seems to have been a long-barrow on the southern edge of Seamer Moor, North Riding of Yorkshire. The four celts are small, with the cutting-edge regular and polished, and the thin butt unpolished, the section being a pointed oval throughout. Creamy white and bluish in

Fig. 100.—Flints found together on Seamer Moor, Yorks.

patina, they have incurved sides, and a section that is theoretically earlier than the square-sided celt of the dolmens: hence a date before the last phase of the neolithic can be assigned to the lozenge or kite-shaped arrow-heads, as well as the flint knife and bone tool that accompanied them.

Cases 73, 74 contain a number of flint implements, ground axes, knives, scrapers, flakes, fragments of coarse pottery, &c., found 1871–8 on the floors of circular hut-sites at Grovehurst, Milton-next-Sittingbourne, Kent. The large number of flakes discovered suggests that this place was a regular factory of flint implements in neolithic times. On one of the boards may be noticed a particularly fine flint knife (fig. 101), probably used as a sickle, resembling specimens from the Thames at Chelsea (Case M) and

Greenwich (Museum of Practical Geology), also from Sowerby near Bridlington, and part of another from Rudstone, East Riding of Yorkshire.

Two delicately chipped arrow-heads of flint are of the recognized neolithic leaf-pattern (as fig. 92, *f*), and another indication of date is part of a particularly thick flint celt with a hinge fracture, semi-circular cutting-edge and pointed oval section, indicating a stage earlier than the Bexley Heath celts (pl. VI). There are several smaller polished celts, broken and mostly re-chipped for further use; but one black celt-like implement, $6\frac{1}{4}$ in. long, is peculiar in having the cutting-edge at the narrow end, the other being crusted. Flint balls, the size of a Tangerine orange, are bruised all over and were probably hammer-stones, to be distinguished from 'pot-

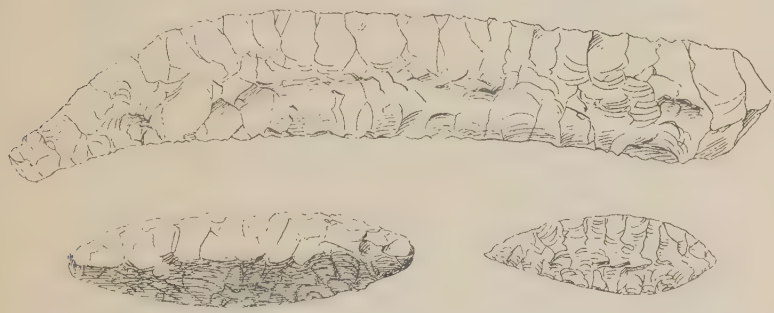


Fig. 101.—Flint knife and points, Grovehurst, Kent. ($\frac{1}{2}$)

boilers' (stones heated in a fire and then dropped into water, the sudden change of temperature disintegrating the surface).

In the southern half of Case T may be seen a variety of exceptional specimens assigned to the neolithic period in the absence of evidence to the contrary, but almost exclusively surface-finds. Those collected and given by Mrs. Sturge are among the best from a famous flint district (Icklingham in north-west Suffolk), and most of them are patinated and lustrous, though perhaps the earliest of them all—a small struck tortoise-core from London Bottom—is jet black with thin buff crust, quite unaltered. Smaller specimens of the same type from the same district have been presented by Mr. Buscall Fox (drawer in Case T). There are prismatic tools (as fig. 71, *d*), hollow and round scrapers (one with double patina showing two periods of use) and examples of thin triangular or quadrilateral flints with convex and concave edges (fig. 102) but varying considerably in outline, which sometimes recalls the blade of a halbert. They are not arrow-heads, but it is difficult to find a name or use for them, and their distribution is peculiar, most coming from Yorkshire, Derbyshire, and Suffolk.

The small tapering rods of flint between 3 and 4 in. long, usually called 'fabricators', as though used for pressure-flaking (fig. 3), are generally worn smooth at the point, and have been explained in Scandinavia as strike-a-lights in conjunction with iron pyrites. A set from a Yorkshire barrow in the Greenwell collection (Case 25) is illustrated in support of that contention

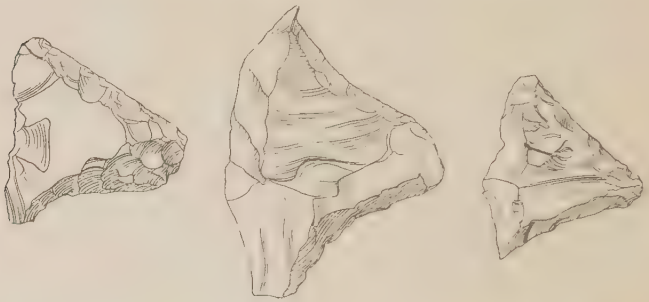


Fig. 102.—Flints of halbert-blade type, Derbyshire. ($\frac{2}{3}$)

Fig. 103.—Knife polished on edge, Arbor Low. ($\frac{1}{2}$)

Fig. 104.—Flint adze, waisted, Stourpaine, Dorset. ($\frac{1}{4}$)

(fig. 5). There are five flat implements of various shapes with a polished edge all round probably for detaching the skin of animals without cutting (fig. 103): they are sometimes called flenching tools.

Peculiar 'waisted' implements, with hollows for holding or hafting, and patinated a dirty white, come from the neighbourhood of Stourpaine, Dorset (fig. 104), where the subsoil is chalk; and Rev. H. G. O. Kendall has collected an interesting series at the foot of Avebury Down, Wilts., another chalky area which may have contributed to the white patina of the whole group. There are small tortoise-cores and, more surprising still, three definite gravers

and diminutive ovates worked on both faces; prismatic tools (like fig. 71, *d*), steep-ended planes and round-ended scrapers, also transverse arrow-heads (like fig. 93), five pieces with the beginnings of polish, and parts of two entirely polished celts. In spite of the uniformity of patina, it is likely that several periods are here represented on the surface, for reasons adduced on p. 68.

A rough-and-ready way of distinguishing Neolithic and Bronze Age perforated weapons of stone is by the drilling—if this is effected from both faces by means of a stick revolving in wet sand the result is an 'hour-glass' perforation with the diameter reduced in the middle; whereas in the Bronze Age it is supposed that

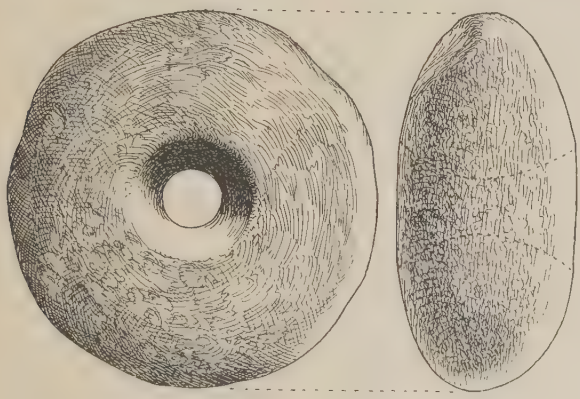


Fig. 105.—Quartzite mace-head, Thames.

a bone or metal tube was used and the perforation is cylindrical (fig. 187). By this test several mace-heads (Case T) made from quartzite pebbles must be neolithic, and a circular specimen is illustrated (fig. 105): others are oval or irregular in outline. The more advanced axe-hammers, made of various materials, date from the Bronze Age, at least in this country; but an exceptional fragment in flint given by Dr. Frank Corner should be noticed—half an axe-hammer found near Gloucester, with sharp cutting-edge and a natural perforation adapted to receive the haft. A parallel case is the complete double-pick from Paris (fig. 162).

The scratches on a large number of flints (pl. VII) found at Icklingham, Suffolk, by Dr. Allen Sturge, and in certain other English counties, are a problem as yet unsolved. Such markings on palaeolithic specimens would generally be attributed to striation by ice, which scratches the rocks and pebbles over which it passes by means of other stones frozen into its under surface. Great

pressure and a sharp edge would be required to scratch the hardest kind of flint (such as the Icklingham specimens), and it is difficult to account for ice-action in the neolithic period, to which these obviously worked flints must be attributed. The patination is generally bluish, due to the original black showing through a film of white produced by molecular change in the surface; and the scratches are of various kinds, ranging from coarse grooves to hair lines, sometimes parallel, in parallel groups, or in all directions, and often most numerous on the projecting bulb of percussion. The white lines observed on some examples are due to pressure which has not been sufficient to break the surface, but has nevertheless bruised it along the line of contact. The great age of neolithic work is proved incidentally by the double patination of certain flints, the first flaked surface now being quite different from the edges, where subsequent chipping or use, after a long interval, has exposed a fresh surface that has since acquired more or less patination (p. 58).

Although for the sake of convenience we use the terms Stone Age, Bronze Age, and Iron Age, there is of course no sharp line of demarcation between the actual periods which they describe. Stone implements continued to be largely used after the introduction of metal, and are constantly found in the round-barrows in conjunction with bronze. Indeed, for certain exceptional purposes, stone and flint have not been discarded even in our own day; gun-flints, grindstones, and burnishers are cases in point. Their survival is not always due to utilitarian reasons, but sometimes to motives of superstition or religion, the methods and appliances of ancient days having acquired in course of time a sanctity which keeps them in ceremonial use long after they have been discarded for ordinary purposes. Thus the Egyptians continued to use stone knives in the process of embalming the dead centuries after the introduction of metals into the valley of the Nile; and the priests of ancient Mexico tore out the hearts of their victims with blades of stone or obsidian, though for secular purposes metal had long been in common use. In the same way men who were well acquainted with bronze and iron deposited flint flakes and stone implements in the graves of their dead in perpetuation of an ancient tradition. The custom was known among the Merovingian Franks, and survived in folk-lore, though with an altered significance, to a much later period. Shakespeare alludes to it in *Hamlet* as an unchristian usage fit only for the interment of a suicide.

As amulets to avert the evil eye and protect the wearer from disease, neolithic implements, especially small axes and arrow-heads, have been in request from ancient times down to our own day in almost every country, civilized or savage, in which stone has been long superseded by metal. Stone axes and

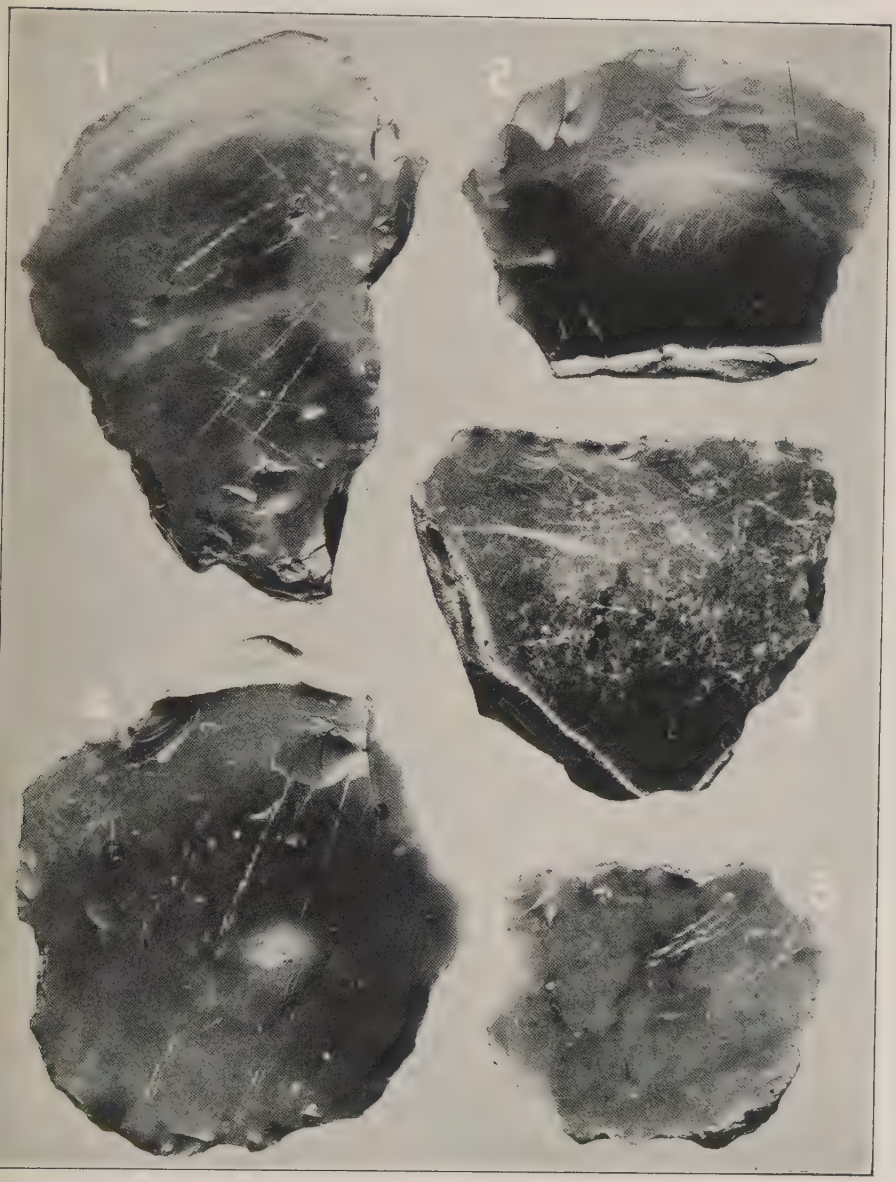


PLATE VII.—SCRATCHED FLINTS FOUND AT ICKLINGHAM, SUFFOLK.
(Case T, *see* p. 107)

flint arrow-heads are often thought to be thunderbolts fallen from heaven, and are known under various names, of which that of 'elf-shot' is the most familiar. Not very many years ago application was made to the director of the Liverpool Public Museums for permission to apply a stone axe-head to the body of a sick child; while the existence of a similar superstition in other countries is exemplified by the specimens exhibited in Case T, which are amulets (fig. 106) worn in different parts of Europe at various times. In Cases 150, 151 are two small polished axes from Egypt evidently used in the same way, while

Fig. 106.—Flint arrow-heads mounted as amulets. (1/1)

the ground haematite axe-heads from the Nile–Congo watershed in Case 148 are held by the present natives of the country to be effectual remedies against disease. The frequent representation of stone axes in conjunction with other ceremonial objects on the curious bronzes from Benin exhibited in the African section of the Ethnographical Gallery affords an additional proof of the same widespread superstition; and in the Gold Ornament Room is shown an Etruscan gold necklace having a mounted flint arrow-head as a central pendant.

In contrast to the palaeolithic hand-axe, the celt or neolithic axe was hafted, but the wood or antler used for the purpose has in most cases perished. Moist surroundings no doubt account for the survival of that from Solway Moss in Case A (fig. 107), but it is now much shrunk, twisted, and broken. The Swiss lakes have produced several wooden hafts, and a few fragments from

Ehenside Tarn in Cumberland are noticed above (p. 102). The methods of modern savages are illustrated on the wall adjoining Case 152 (p. 191).

A type series of celts and items of special interest are exhibited in Case T, the remainder being arranged according to counties in Cases 75, 76, where a fine collection from the Thames will attract attention. The Yorkshire celts are less frequently of flint than of basalt, and volcanic ash brought by glacial action from Borrowdale in the Lake district and found by neolithic man in the local drift. Though there is Upper Chalk in the East Riding, the flint

Fig. 107.—Stone celt in original haft, Solway Moss. ($\frac{1}{7}$)

Fig. 108.—Arrow-head with ripple-flaking, Bridlington. ($\frac{1}{1}$)

of the Wolds is of inferior quality; and the grey flint of Lincolnshire was much in demand for polished celts in various parts of the country.

Another local peculiarity is the ripple-working of flint arrowheads (fig. 108) in the neighbourhood of Flamborough Head on the Yorkshire coast. The type has a single spur or barb, and is passing into the hollow-base stage, consequently of latest neolithic date. The narrow parallel flakes were removed by pressure, and such dexterity was only equalled in Denmark (fig. 177) and Egypt (Case 150). It is difficult to resist the conclusion that they were made here by immigrants from the Baltic, and there is further evidence of contact in the flint daggers (Case 89), which date in Britain from the early Bronze Age.

For the first time in Britain pottery spoons (Case T) were found about 1901 on the boundary of Hurstpierpoint and Clayton

parishes in Sussex, where they had been scratched out of a sand-pit by rabbits. They have been published and presented by Mr. J. E. Couchman and are here illustrated (fig. 109). The type has long been known as neolithic grave-furniture abroad, and numbers have been found, for example, at the Camp de Chassey (Saône-et-Loire); but they are more common in the south of Europe than the north, and assume various forms, some of them more convenient than those exhibited here or the bronze examples of our Early Iron Age.

The rotary quern or hand-mill for grinding grain was certainly known in the Early Iron Age, but the date of its introduction into Britain is at present unknown: and in neolithic times it is safe to assume that a more primitive form known as the saddle-quern was in use. Examples are shown under Case D, and a heavy roller from Tilbury on the right of Case 74 may have been used as the upper stone, though unlike one found with a 'saddle' in Wales (Case 5). Pestles also were in use, probably for crushing grain in natural rock-cavities, and a good example from Kenny Hill, Mildenhall Fen, is on the right of Case 74. It was found at a depth of 7 ft. and measures 15 in. in length, probably the longest found in Britain.

Fig. 109.—Two clay spoons, Hassocks, Sussex. ($\frac{1}{2}$)

WALES

Wales is poorly represented (p. 74), but a good polished celt of the thin-butted type from Cardiff and four of various forms and colours from Anglesey are exhibited at the side of Case 76, next the entrance to the Terra-cotta Room. A re-chipped celt from Cowbridge, Glamorganshire, illustrates a curious practice of the late neolithic or perhaps Bronze Age people: instead of repairing a broken celt by grinding, they preferred to render it serviceable by rough flaking, and the celts thus mutilated are those with pointed oval or oblong section, of a period when polishing was the usual process. The same crude method of restoration has been observed in France, and an oblique cutting-edge explained by a readjustment of the axis.

An important factory site known as Graig-lwyd was discovered by Mr. Hazzledine Warren in 1919 on the slopes of Penmaenmawr,

a mountain in Carnarvonshire. The rock used was the local scree, a fine-grained felsite naturally bluish-grey: a thin brownish crust is produced by weathering, and the stone eventually turns white and porous, but is extremely tough when fresh, and difficult to work. The perfect implements were naturally taken away, and the débris consists of roughed-out blocks often of considerable size (glazed end of Case Q), broken celts which can frequently be rejoined, flakes often with facetted butts but detached from celts and not having the facets at right angles to the face like the Levallois type. Most of the finished celts have pointed butts, but some approach an oblong outline and there are many resembling palaeolithic hand-axes. The absence of square sides (p. 157) is some indication of date; and though some allowance must be made for the difference in material, the main industry seems to precede the Dolmen period, in spite of a marked tendency to

Fig. 110.—Portions of celts, Penmaenmawr. (1/4)

the thin-butted type (fig. 110). Patina is an unsafe guide, as two halves of a 'rough-out' were found, but only one of them was patinated. Polished specimens were exceptional in a collection of many tons, and there was a strange scarcity of hammer-stones: a spherical one of the same material is shown in this Case.

SCOTLAND

Such is the dearth of evidence with regard to our early Neolithic that any likely correlation with continental movements should be carefully considered. The fauna of the 100 ft. raised beach in Scotland is arctic, and so far corresponds to that of the Yoldia Sea (p. 155), which extended from the Skager Rak to the White Sea. In early post glacial times, therefore, the sea was 100 ft. higher or the Scottish coast was 100 ft. lower than at present. The Ancylus Sea which followed was a freshwater lake due to an upheaval (or fall of sea-level) which joined Denmark to Sweden and may well have exposed our shores, which supported forests of fine oak and hazel now submerged: on these lines the Littorina Sea, deepest at the time of the Shell-mound culture, would correspond to the 25 ft. beach of Scotland, which rests on a bed of peat

and is held to be later than the Submerged Forest period. This corresponds to the Larne raised beach of north-east Ireland; but, on the other hand, there is archaeological evidence for a Mas d'Azil date.

No doubt owing to the intensity and persistence of glacial conditions, no Drift period has been recognized in Scotland, but, according to the Abbé Breuil, flints from the 25–30 ft. raised beach at Campbeltown, Argyll, are pre-neolithic and may belong to the period of La Madeleine. The evolution of the harpoon-head is noticed elsewhere (p. 137), and the flat type with two rows of barbs and broad base, sometimes perforated, dates from the transition period of Mas d'Azil, not purely palaeolithic nor neolithic. It is normally accompanied by painted pebbles, small round scrapers (p. 91), and blades of flint like pen-knives: all these items are found in Britain, but it should be observed that the painted pebbles of the Keiss brochs in Caithness date from the Early Iron Age, unlike those from the Victoria Cave at Settle, Yorks., where a typical harpoon was also found. Double harpoons, one (at least) perforated, have been found in MacArthur's Cave facing the bay of Oban; and there is geological evidence to show that this opening in the cliff face, now 100 yds. from the beach and 30 ft. above high-water mark, was inhabited by man at a time when the sea could deposit shingle inside the cave. Other harpoon-heads of deer-antler, single and double, have been found in the rock-shelter of Druimvargie, Oban, and in shell-mounds in Oronsay. Pygmy implements, which in default of evidence to the contrary may be assigned to the Tardenois period, have been found on a low terrace of the river Dee near Banchory, and at Dryburgh, Berwickshire; and one has been illustrated from Traprain Law (East Lothian); but here and elsewhere the lower limit of their period has not been fixed, and specimens from the sand-hills are always likely to be mixed. A small series from Glenluce, on Luce Bay, Wigtonshire, includes three small flint saws; and a few small round-scrapers suggesting Tardenois (p. 19) come with miscellaneous flints from Aberdeenshire. That material is rare in Scotland, but arrow-heads of various red and brown shades are common in Aberdeenshire and Banffshire, and a box contains many leaf-shaped specimens from the former country, the barbed and tanged series being shown with other objects of the Bronze Age in Case 87.

A tabular stone from Scotland under Case S has cup-shaped hollows probably due to its use as an anvil in flint-working; and may be compared with hollowed pebbles such as fig. 134. Grinding-stones of quartzite and sandstone were used for polishing celts and other implements after they had been roughly shaped by chipping.

In Cases 75, 76 are celts both polished and unpolished from Scotland, mainly from the Shetlands, where many reach unusual

proportions; some are made of green porphyry. There may also be mentioned a thick celt of limestone now decalcified, with a pointed butt recalling those preceding the Dolmen period (p. 95). A grooved stone axe-hammer from Caithness resembles a specimen from Sicily (fig. 185) and a series of mallets that seem to be connected with early mining, and are found in the south of France, Finistère and Normandy, as well as in the copper district near Cordova and elsewhere in Spain; Ireland, Denmark, Italy, Russia, Austria, Sinai, North and Central America, have also yielded specimens of this type.

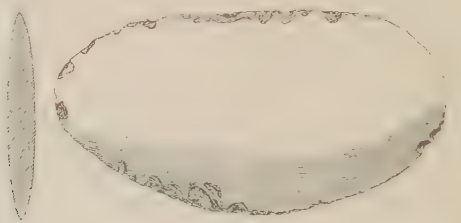


Fig. 111.—'Pict's knife', Shetland Islands. (⅓)

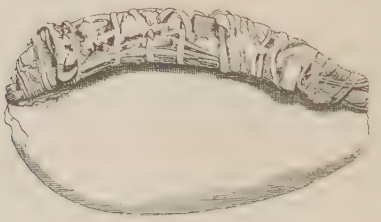


Fig. 112.—Eskimo knife, Alaska. (⅓)

Several 'Picts' knives' (fig. 111) of greenstone from the Shetland Islands, where sixteen were found together in peat-moss 5-6 ft. from the surface, resemble the blades used in recent times by the Eskimo of Alaska for scraping skins and removing whale's blubber; and it is probable that the same kind of handle along one edge (fig. 112) was adopted in both localities.

IRELAND

Ireland, like Scandinavia, is generally considered to have been uninhabited in palaeolithic times and was certainly covered with an ice-sheet, but in view of the evidence for warmer intervals elsewhere, it is possible that the glaciation was not continuous. In any case the ordinary palaeolithic fauna was found in several

caves excavated by the late Mr. R. J. Ussher, and there are specimens in Cases 77, 78 that are difficult to explain as neolithic. A representative series comes from sand-hills on the shore of Whitepark Bay, five miles from the Giant's Causeway, co. Antrim. The site is one of many discovered on the north coast of Ireland that are now covered with sand but were evidently inhabited in neolithic times. The original surface at Whitepark Bay is specially interesting and contains worked flints, whereas in many other stations the remains are found only in the sand, which has accumulated sometimes to a thickness of 20 or 30 ft. above the prehistoric stratum. This is a black band about 3 in. deep, which, however, in some of the hut-circles attains a depth of 36 in. Examples of earlier worked flints with weathered surfaces are also found on these sites, and show signs of having been re-chipped by neolithic man, but it is doubtful whether any human work on them goes back to palaeolithic times. This series was excavated and presented by Mr. W. J. Knowles, who considers the hollowed pebbles to have been used as anvils in the manufacture of flint implements, and there is a gradation from a few pick-marks to a smooth saucer-shaped depression, sometimes on both faces of the stone, recalling several found in French palaeolithic caves (Cases 113, 118, and fig. 134), where they are supposed to have been used for pounding pigment. There are, besides, hammer-stones made of flint, quartzite, and other hard pebbles bruised at the end; and scrapers, generally round, but in some cases elongated and steeply chipped at the end. It is noteworthy that no polished implements have been found in association, but there is at present no means of fixing the relative date of this find in the neolithic period, though the ochreous re-chipped flints are clearly earlier than the whitish-grey series that can be matched from the shell-mounds of Denmark. Fragments of rude pottery vessels, with ornament produced by impressing cords in the wet clay, are shown with animal bones and teeth of recent species. References to papers on the subject are given on a board in Case 78.

A dozen examples of picks and celts made of thin local basalt represent a vast quantity of implements mostly broken or incomplete from the Tievebulliagh site near Cushendall, co. Antrim, which has been described by Mr. W. J. Knowles. Little but factory débris is found on the top and slopes of the mountain, the successful pieces being no doubt taken down to be finished and ground in the valley, where red sandstone was available. The raw material—a bluish close-grained rock—was obtained from Boulder-clay on the mountain and may have come originally from Scotland. The roughed-out celts and worked flakes are associated with the clay immediately below the local peat, which seems to have grown on a weathered (long exposed) surface. On the bed of hard peat grew the Scots pine (*P. sylvestris*), in the roots

of which are often found polished stone axes of a later period; but the interval is at present of unknown length. The main type manufactured on the 'floor' is a celt (fig. 113) with rather thin butt and pointed oval section; but there are also many tools made from flakes, and failures were frequently adapted for various purposes.

Worked flints including cores, from a raised beach at Larne, co. Antrim, were collected and presented by Miss Layard. They are of different forms and colours, and have been discussed from

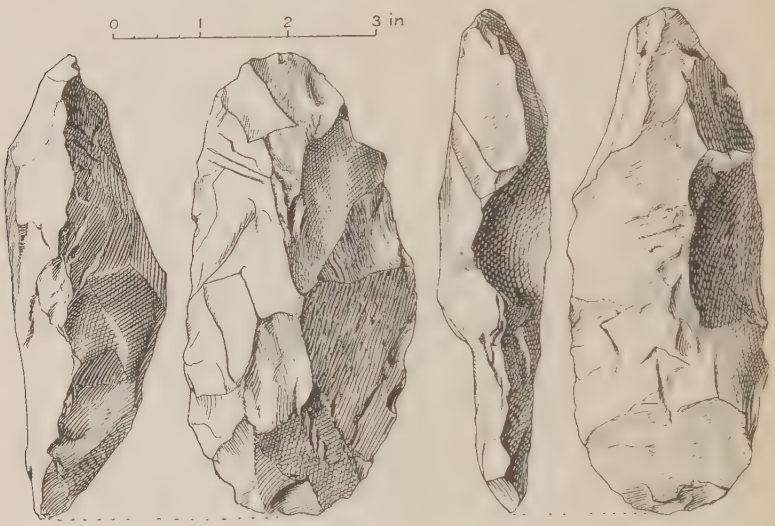


Fig. 113.—Two rough celts, Cushendall, Antrim.

time to time, but no clue to their relative date or dates has been found. In a section of 15 ft. the upper layers produced, in the first 3 ft., flints with unchanged or a bluish surface, with iron-staining in blotches and along the ridges: below these the iron-staining ceased, and the flints were thickly coated with a white porcellanous patina. In the lower levels, especially at 9 ft. from the surface, the flints were much rolled and had evidently been exposed on a shore before the sinking took place, which preceded the formation of a beach 20 ft. above present high-water mark.

Two polished celts, from Island Magee and Clough, Antrim, have incurved sides suggesting an imitation in stone of a metallic form, probably of copper; and many larger specimens are exhibited below the adjacent Case T.

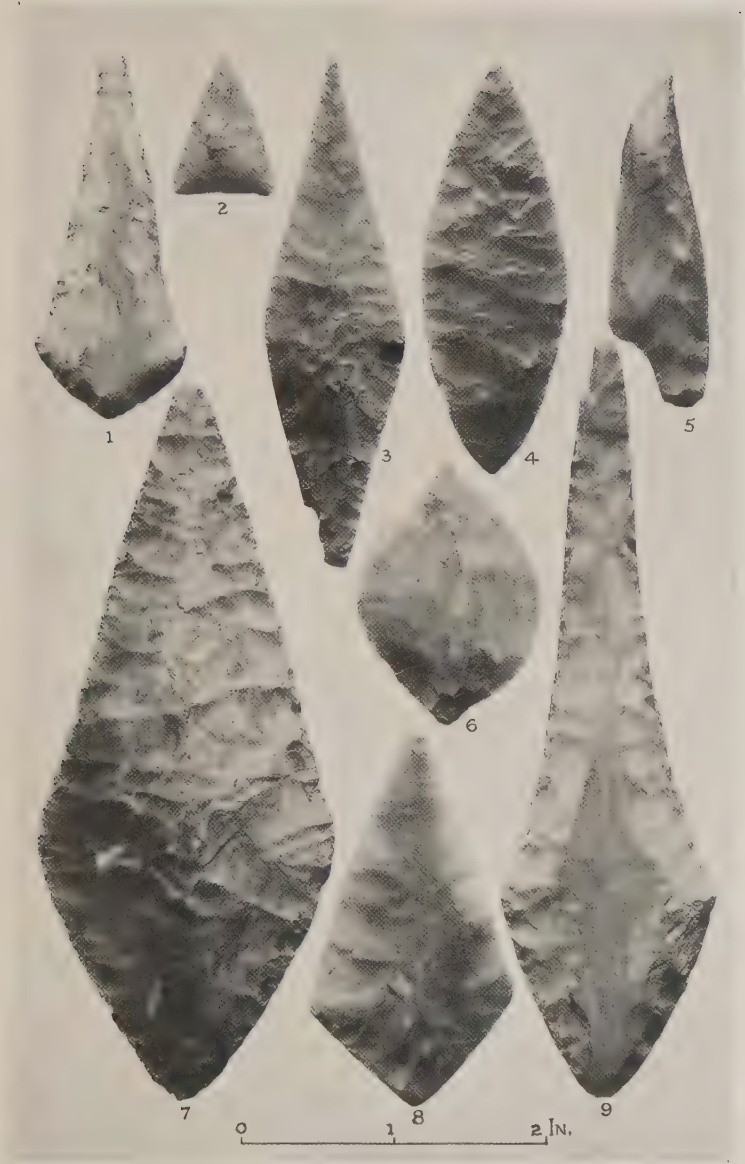


Plate VIII.—Neolithic Lance and Arrow-heads, Ireland.
(Case 77, *see* p. 117)

These neolithic implements are mostly ground and polished, but in many cases slightly unsymmetrical: the majority are made of fine sandstone, greenstone (diorite) and chert (hornstone), and come from the north-eastern counties, where there is flint-bearing chalk. Besides the celts, of which a large number have been found, there are exhibited hammer-stones made of pebbles with signs of use at the end or side; and a number of flint flakes known as hollow-scrapers (fig. 114) with the edge worn concave by use, as in smoothing the shafts of spears. Exceptionally good are the thin pointed-oval blades, $2\frac{1}{4}$ $3\frac{1}{2}$ in. long, worked on both faces like a hand-axe, from the valley of the Bann, but their date is not yet determined.

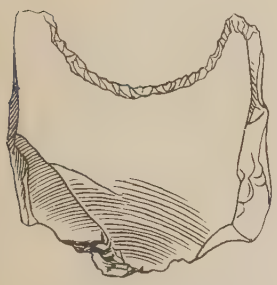


Fig. 114.—Hollow-scraper of flint, Ireland. ($\frac{1}{1}$)

Fig. 115. — Polished arrow-head, Ireland. ($\frac{1}{1}$)

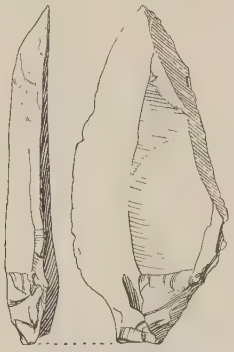


Fig. 116.—'Point' with 'pinched' butt, Ireland. ($\frac{1}{2}$)

Special prominence has been given in the illustrations (plate VIII) to the flint arrow-heads and other points from Ireland, on account of their excellent workmanship and the variety of their forms. Some are ground on one or both faces (fig. 115), a peculiarity that is also found in Portugal. All the patterns here exhibited are supposed to be derived from the point with semicircular base, along two distinct lines. First the base becomes straight, making the whole triangular; the base is then notched in the middle and the two barbs evolved, which eventually curve inwards or are further extended in the line of the sides. The other branch includes the lozenge, where the base is pointed. This feature develops into a tang which often accompanies the barbs already mentioned, but is thought to have been reduced to a mere stump on account of the inward curvature of the barbs. Good examples of these extreme forms may be seen in the Egyptian section (Case K), and some in Ireland have the single barb so exaggerated as to approach in outline the shouldered point (*pointe-à-cran*) of late Solutré times. It will be noticed that what are considered

neolithic forms (broad and narrow, leaf-shaped, kite-shaped, and single-tanged) are darker in colour than the barbed and double-tanged forms assigned on British evidence to the Bronze Age, which are white or grey in colour; and the same rule perhaps holds with regard to the flakes. From co. Antrim come several brown specimens (fig. 116) resembling the 'point' of Le Moustier, with a pair of notches at the butt that can hardly have been of service in hafting. The late Maurice Bourlon explained similar notches on a 'point' at Le Moustier as forming a rudimentary tang, a feature now recognized in the contemporary industry of the Sahara; and similar flakes with 'pinched' butt found in Egypt have been referred by Prof. Seligman to the period of Le Moustier.

FRANCE

Before the French palaeoliths are described, mention must be made of flints from Tertiary beds that have been thought by some to show signs of human workmanship. To the upper Oligocene were formerly referred certain split and crackled black flints found at Thenay (Loir-et-Cher) (Case 99). They have certainly been in the fire, but that is much more likely to be due to accident than to primitive man, and in their present condition they could have served no useful purpose. The Dinotherium has been held to mark the horizon of the Puy-Courny and Puy-de-Boudieu flints in the Cantal, attributed to the upper Miocene and represented by a few specimens in this Case. These are of a more serviceable appearance, but their human origin is not by any means generally accepted.

A tray contains specimens of machine-made 'eoliths' from the cement works at Mantes, near Paris, where flint and chalk are separated in washing-mills. The flints are battered to some extent by rotating iron teeth and by striking against one another, so that the edges are often chipped in a manner recalling the plateau flints of Kent. The operation has been watched by several eminent archaeologists in France, and the series here exhibited was presented by Dr. Capitan, who, with many others, believes that eoliths can be explained by natural causes, especially by the action of torrents in a stony channel.

In the upper Pliocene beds occur the flints of St. Prest (Eure-et-Loir, France), accompanied by *Elephas meridionalis*, and these may be equated with those of the Cromer Forest-bed, which contains the corresponding fauna (p. 24).

The importance of the Somme valley both to French and English archaeology is due in the first place to Boucher de Perthes, who began finding implements there in 1839 (p. 7); secondly to

Sir Joseph Prestwich, whose detailed analysis of the terrace deposits was published by the Royal Society in 1860; and lastly to Professor Commont (died 1918), who issued a series of papers on the subject, and established finally the sequence of the beds and implements.

It is interesting to note that what are generally considered the oldest flint implements found in France occurred in gravel very little above the bottom of the present valley. This was at Chelles-sur-Marne, about ten miles east of Paris, where three successive layers of gravel surmount the Tertiary deposits. The lowest of the three contained fossil bones of the straight-tusked elephant (*antiquus*), Merck's rhinoceros (*leptorhinus*), and the giant beaver (*Trogontherium Cuvieri*), all of which occur among the earliest Pleistocene mammals; in this deposit the implements were unrolled, and there was no trace of the mammoth or woolly rhinoceros. Above this was a bed with water-worn pebbles and bones of the mammoth, while the uppermost bed was sandy gravel containing erratic blocks, flint implements of the later type, such as occur in the cave of Le Moustier, and remains of the ox, horse, and deer.

The implements of the lowest bed at Chelles are rougher than those found above them, and the fauna justifies their attribution to an earlier date; hence it is clear that the oldest types are not always found in the high-terrace gravels, but that the valley was practically cut to its present depth at the opening of the Pleistocene era, or at least before the 'warm' fauna left the country. Though implements lying in the bed of the river when the major valley had been cut (shown by the dotted line in fig. 8) would naturally seek a lower level as the valley deepened, and might thus eventually rest on the lowest terraces, it is still difficult to see how they could have escaped considerable rolling in the interval; and the discovery at Chelles bears witness that the earliest did so escape, though subsequent deposits contained implements evidently of later date that were much water-worn.

Details of the various terraces are given on a tablet in Case 103. As in the Thames valley, the 100 ft. terrace is the most prolific, but goes under various names the 30 metre, middle, or second (from below). It is now held that the main gravels are the only true river deposits on the terraces, the ancient alluvium as opposed to the hill-wash of sharp flints (*cailloutis*) and loams (*limon*, *loess*, *ergeron*, which is a corruption of *argillon*), which were due to subaerial action: these can therefore have been deposited on more than one terrace at the same time. In the base gravel of this terrace at St. Acheul, just above Amiens, have been found numbers of hand-axes, of the Chelles type and period, with striking patination peculiar to this horizon: orange colour near the crust, passing into yellow, and one face olive-colour with yellow splashes.

Specimens are exhibited in Case 100, and show few traces of rolling.

Just above this gravel, at the base of the early loess (*sable roux à points noirs*), Professor Commont found, both at St. Acheul and Abbeville, flints split by the frost and Chelles hand-axes in the same condition. This is also said to have been observed near Toulouse, and points to a cold spell in or just after the Chelles period—perhaps the result in France of the Mindel glaciation of central and northern Europe (p. 53). There is more of the chalky deposit called *presle* between the Chelles and St. Acheul horizons than at the base of the *ergeron* (period of Le Moustier), where it perhaps represents the Coombe-rock of Sussex and Kent. In the Carpentier pit at Abbeville, on the third or 40 metre (133 ft.) terrace of the Somme, a striking resemblance has been noticed to the Swanscombe section (fig. 16), and several implements have come from the angular gravel below the red loam (*limon rouge*): these were all ovates of St. Acheul I type, unpatinated or with yellow or reddish patina, unrolled and lustred by the sand, and rarely with twisted sides. No heavy-butted hand-axe has been known to come from the pit, and the homogeneous character of the implements is worth recording.

A pre-Chelles industry was noticed by the same observer in the base-gravels of the second (30 m. = 100 ft.) and on the edge of the third (40 m.) terrace at St. Acheul, and the same deposit at Abbeville yielded a fauna with Pliocene affinities (as at Ingress Vale, Greenhithe). On this evidence he went so far as to say 'from the chronological point of view Abbeville = Forest-bed (of Cromer)'—an opinion that agrees better with the table on p. xiv than with his own or his French colleagues' classification. The rise of the sea which deposited marine-shells in the *sable aigre* and underlying gravel (p. 121) at Menchecourt, near Abbeville, may thus be connected with the glaciation that formed the Cromer Till and brought Scandinavian boulders into East Anglia, across what is now the North Sea and was formerly the estuary of the Rhine. Though not glaciated itself, France would be affected in some measure by the advance of the ice-front as far south as the Thames (Mindel glaciation).

Mention must also be made of a palaeolithic 'floor' in the Tellier pit at St. Acheul, described by the late Prof. Commont. Above the chalk the deposits are here 32 ft. thick (146 ft.–178 ft. above the sea, covering the second and third terraces); and at 151 ft., at the base of a bed of brown argillaceous sand (*limon panaché*) above the middle gravels were traces of an old land surface, with *Elephas antiquus* and flint implements marking the transition from the Chelles to the St. Acheul type. They are of black flint with dull white patina, unrolled as generally on a 'floor', with smaller implements of unpatinated black or grey flint in the upper part of

TABLE SHOWING STRATIFICATION AND HORIZONS OF IMPLEMENTS AT ST. ACHEUL, AMIENS, DÉPT. SOMME, FRANCE
(compiled from M. Commont's memoirs)

Series.	*Beds with French Names.*	*Description of Beds.*	*Period.*	*Occurrence and Character of Implements, etc.*
Upper.	Terre-à-briques	Upper brick-earth	Neolithic	Flints, of many forms.
		Lower brick-earth	La Madeleine	Bluish blades: planing-blades and graving-tools.
	Loess récent (called ergeron)	Stratified sandy loam (later loess)	Solutré	Barren, except in intercalated bands of gravel.
	Cailloutis	Upper gravels	Aurignac	
			Le Moustier	Bluish-white flints; Levallois flakes; hand-axes rare.
Middle.	Limon rouge fendillé (sable des fondeurs)	Foundry sand (decalcified loess)	St. Acheul II.	Flat oval implements called *limandes*, lanceolate and small specimens, lustrous white patina.
	Limon grisâtre à poupées calcaires	Grey loam with calcareous concretions		Large 'race' nodules: small in later loess.
	Sable roux (doux) à points noirs (loess ancien)	Red sand with manganese specks (early loess)	St. Acheul I.	Reddish 'limandes' (flat ovate) lustred by sand but not patinated: also small implements; grey or yellow flint, unrolled. Twisted ovate implements common.
	Cailloutis	Middle gravels		
Lower.	Sable gras (terre-à-pipe)	Sticky sand (yellowish white)		Upper part with fossil land-shells (glaise). Lower part with fossil river-shells (sables).
	Sable aigre (or maigre)	Sharp white sand	Chelles	Hand-axes including *ficrons* (long points), and implements with thick butts, unrolled and unpatinated: black or yellow lustred flint.
	Gravier du fond	Lower gravels (resting on chalk)	Early Chelles	Worked flakes with primary chipping, deeply patinated (orange and olive) and retaining much of the greenish-grey crust.

the same bed. The loam of the lower loess (*limon rouge des fondeurs*) contains implements of lustrous white patina without markings, almost like porcelain. Between this and the base of the upper loess come implements which are white on the lower face and bluish on the upper; and in the angular gravel (*cailloutis*) immediately above, of early Le Moustier date, the patina is generally bluish white, sometimes with 'basket-pattern' (*vermiculé*, as pl. II, no. 2), much like the series from Northfleet in Case S. In these cases patination is certainly a test of period.

In the upper basin of the Garonne, where flint does not occur, palaeolithic man made use of quartzite which does not flake as easily or as regularly as flint, so that Drift implements from the south-west of France have a primitive appearance, though the fauna includes mammoth, woolly rhinoceros, and cave-lion, characteristic of St. Acheul and Le Moustier. The Chelles industry with a warm fauna seems to be wanting in this area, and local implements belong to the later stages of the Drift, when the climate was decidedly cold as far south as the Pyrenees. A fine pointed hand-axe of this material from Muizon, Marne, is in Case 102; and four from Haute Garonne, with small ovates from the North (La Ganterie and Bois-du-Rocher, Côtes-du-Nord) are in Case 103.

Following the industry of St. Acheul is a transition stage called after La Micoque, in the Vézère valley near Tayac, where the beginnings of the Cave industry have been noticed in association with a definite fauna, chiefly horse, a few bones of *Bos primigenius*, but none of the reindeer, that species first appearing at the close of Le Moustier. This deep open-air deposit is calcareous with a good deal of breccia, and the implements (Case 109) are small, having much the appearance of biscuit, the chief type pointed, flat on one face and coped on the other, the ridge not being in the middle line. These seem to be half side-scraper and half hand-axe, and well mark the transition to flake implements, which are at first associated with an arctic climate and with Neanderthal man, the human type of the Lower Palaeolithic being at present imperfectly known.

In Cases 100, 101, a general similarity will be noticed between the French and English Drift series, and particular attention is drawn to implements called *picrons* (p. 45) with slender point and heavy butt, from the lower gravels of the 100 ft. terrace at St. Acheul (fig. 117) and the Thames (fig. 34): they were succeeded by the ovates (*limandes*) which gradually improved. The various chippings and patinations of a massive implement from St. Acheul (fig. 118) can be matched on one from Kempston, Beds. (fig. 49). In these Cases implements from St. Acheul are arranged in groups to show the sequence as far as possible (p. 121), and the white series in Cases 101, 103, will show that the patina is not merely accidental.

The adjoining Cases 102, 103 contain several specimens collected

in the neighbourhood of Abbeville further down the Somme and given by M. Boucher de Perthes, whose medallion is exhibited, with sections of the Somme terraces and the corresponding levels in the valleys of the Somme and Thames. The third terrace upwards (133 ft. above the sunk channel) includes Champ de Mars, Moulin Quignon and St. Gilles ; Menchecourt and Mautort being on the 100 ft. terrace (here 40-50 ft. above the sea).

The three shown from Chelles are not typical of this site ; but there are good examples of St. Acheul style in the Morel collection from Marne and Aube. The series from Vaudricourt (Pas-de-Calais)

Fig. 117.—Pointed hand-axe, St. Acheul. ($\frac{1}{3}$)

Fig. 118.—Re-chipped hand-axe, St. Acheul. ($\frac{1}{4}$)

contains various types, especially two of *vesica-piscis* form (long pointed oval) given by Sir John Evans. It will be noticed that some from this and other sites (as Sens, Yonne) have iron markings in spots or lines (mostly on the ridges) that are sometimes explained by contact with the ploughshare ; but if these are surface finds they are none the less palaeolithic. The raw material sometimes came from Tertiary deposits, and is best described as chert : specimens of late Drift type come from a factory site at Tilly, Saligny, Allier (Case 104), others from Poitiers and Leugny, Vienne (Case 102).

A small series collected during the war and given by Capt. Francis Buckley is in Case 103, all highly lustrous but some entirely white, others (including a small tortoise-core) quite black. They lay under 5 ft. of loess in the trenches at Coigneux, near Acheux, Somme, and are referred to the period of Le Moustier.

Triangular hand-axes and 'points' of the latest Drift are shown in Case 105 from Pontlevoy, Loir-et-Cher, and larger examples (figs. 119, 120) from Coussay-les-Bois, Poitou, are in Case 104, with a good marbled ovate (like pl. II, no. 2) found 5 ft. below the surface at Régny-le-Ferron, Troyes, Aube.

Montières, below Amiens, four miles from St. Acheul, is specially interesting as a typical Levallois site; that is, the bulk of its worked flints are broad flakes of peculiar form (fig. 22) named after the Levallois-Perret quarter, Paris, where many have been found (Case 105). The deposits belong principally to the upper series of MM. Ladrière and Commont, but the whole succession,

Fig. 119.—Triangular hand-axe, Coussay-les-Bois, Vienne. ($\frac{1}{3}$)

Fig. 120.—Ovate hand-axe, Coussay-les-Bois. ($\frac{1}{2}$)

from the earliest drift-types down to and including the reindeer period, has now been traced in one or other of the pits. The Levallois flakes are generally unused, but some show signs of secondary chipping or use as scrapers; and most have a white or creamy patination. Like the Northfleet series in England (p. 33), they have normally a facetted butt and were struck from prepared cores of the 'tortoise' type. There is now a tendency in France to include these in St. Acheul II. Specimens of the same culture are exhibited from Mont Guillain, Goincourt, Oise; La Motte Piquet, Paris; St. Roch, Amiens, and two from Porte Mercadé, Abbeville, given by Boucher de Perthes in 1862, and found at $38\frac{1}{2}$ ft. from the surface (10 ft. below bone bed, and 3 ft. below grey peat).

Before proceeding to the type-station of Le Moustier, notice must be taken of contemporary finds in the Island of Jersey which even before the Straits of Dover were formed, was separated from Britain by the Channel river (p. 61). Jersey serves as a link

between the Dordogne and the outer circle of cave-deposits from Torquay through Wales to Derbyshire and Yorkshire. The Kent land-bridge (a continuation of our chalk Downs) would explain the obvious connexion between the cave-dwellers in our hills and in the Dordogne, as well as the migration of Pleistocene animals to districts now isolated from the Continent.

A cave in the sea-cliff, known as la Cotte de St. Brelade, was excavated for the Société Jersiaise under the direction of Dr. R. R. Marett, and a type series of the flints has been presented by the Society. Thirteen human teeth found in the cave were referred by Sir Arthur Keith to Neanderthal man, and the abundant relics

Fig. 121.—'Point' with facetted butt, Le Moustier cave. $(\frac{2}{3})$

of bone, flint and other stone were evidently of Le Moustier date. The fauna consisted of twenty-eight species (including mammoth, woolly rhinoceros, Irish elk, reindeer, red-deer, roe-deer, horse, urus, cave-hyaena, banded lemming, and several birds) implying an environment ranging from steppe to tundra (p. 10). A few of the specimens in Case 107 are selected for illustration on various grounds. Of the two Le Moustier 'points' one (fig. 121) has the facetted butt seen normally on the ovate flake-implements, which closely resemble that figured from the type-station (fig. 124), the process being the same as at Northfleet (p. 33). A tortoise-core is roughly 3 in. in diameter, but larger specimens were found; and the facetted butt is seen on a 'square' side-scraper, the type being represented by hundreds of specimens, though rare elsewhere, as at Kent's Cavern (p. 71) and Grime's Graves (fig. 74). Several blades have one side worked into a curve towards the point and others show the notch (*encoche*) that is frequent in the Aurignac culture (p. 129). Attention may also be drawn to a disk

$1\frac{1}{2}$ in. in diameter; two hollow scrapers, of a type also found in Ireland (fig. 114); a re-chipped point with contrasting patinations implying a long interval; flakes of greenstone (one rubbed smooth on the edges); banded flint (probably from the south of England), and a number of diminutive flint chips, which do not seem to be mere workshop refuse but are not pygmies in the technical sense. That all the relics are of Le Moustier date (or earlier) is confirmed by the occurrence of mammoth and rhinoceros with arctic rodents at the top of a 12 ft. section in the filling of the cave.

The Dordogne cavern called Le Moustier is on the right bank of the Vézère, about a furlong from the river, at an elevation of 90 ft.

Fig. 122.—Side-scraper, Le Moustier, Dordogne. $(\frac{1}{2})$

Fig. 123.—Hand-axe, Le Moustier Dordogne. $(\frac{2}{3})$

(see the drawing in Case 120). The level of human occupation in palaeolithic times had been covered to the depth of 5 or 6 ft. by earth, which filled the Grotto to the roof. This was explored by Messrs. Lartet and Christy in 1863, but another cave 33 ft. lower down the cliff has since disclosed a still earlier phase of the culture, which is now seen to range from St. Acheul into Aurignac. The characteristic implements of flint (Cases 105–8) are mostly chipped on one face only, and have a curved scraping-edge, opposite which is generally a portion of the original crust to serve as a grip (fig. 122): these implements are occasionally found in the river-gravels of this country (specimens from Stoke Newington, Case 64, and Suffolk, Case 68), as well as in France; and many hand-axes of late river-drift type also occur at Le Moustier (fig. 123). A fine example of the Levallois flake-implement, struck like those

of Northfleet from a tortoise-core, has had the bulb of percussion subsequently removed, and is an ovate with one flat face (fig. 124).

The so-called 'point' of Le Moustier was produced by the gradual

Fig. 124.—Levallois flake-implement, Le Moustier. ($\frac{1}{2}$)

Fig. 125.—Triangular 'point', Le Moustier. ($\frac{2}{3}$)

reduction of the two edges by use as scrapers (*racloirs*), till they met in a point opposite the butt, and a gradual decrease in the number of hand-axes marks the successive stages of this industry. A special form of the point (fig. 125) has a straight butt (ending

in a right-angle and a curve) which seems to be destined for a cutting-edge at the expense of the sides (p. 45). One of the most striking features of the series is the absence of patina, the flint having retained its original black owing to protection from the light and weather. The fauna of Le Moustier sites is ambiguous, and though all are agreed that the period coincided with a glaciation (of disputed identity), there is evidence that it opened with a warm climate (p. 14).

There is also a good series of the same period from La Coutellerie, Le Moustier, formerly in the Peccadeau de l'Isle collection; and a quartzite industry is represented by flakes and lumps of Le Moustier date from the yellow loam (*limon jaune*) in the Grotte de Biz, Aude (Case 108). The group from Fitz-James, Oise, presented by the Abbé Breuil (Case 106), has evidently had a different history and shows the beginnings of patination—a light blue ground with white markings like pl. II, no. 2. The uncouth forms will be a revelation to those who judge of Le Moustier work by selected specimens.

The best examples of Le Moustier work, however, belong to the closing phase and come (with some of the earlier stages) from La Quina (Gardes, Charente), a rock-shelter which has been excavated with marked success by Dr. Henri Martin, the donor of an 'anvil' made from the bone of a bison (Case 104). This discovery of the early use of bone was made in 1906; but Prof. Pittard noticed it in the same period at Les Rebières (near Brantôme, Dordogne); and the hacked piece of an elephant's thigh-bone (like the blade of a cricket-bat) found at Piltdown (Natural History Museum) may take the shaping of bone back to a much earlier date. A group of flints from this site (Case 108) was presented by the late Miss A. C. Breton, and includes side-scrapers (*racloirs*), some with steep sides produced by scaling or resolved flakes; and a curious hoof-shaped implement, which is strictly neither a side- nor an end-scraper (*grattoir*). A series (in a drawer of Case R), given by M. Léon Coutil, comes from St. Pierre du Vauvray, Eure, and is attributed to a palaeolithic stage before the hand-axe was extinct.

Hand-axes are absent from the horizon of La Quina, though they are said not to have ceased entirely till Aurignac times; but between these stages came a surprisingly rough industry, named after the Audi rock-shelter (Abri Audi) at Les Eyzies, and perhaps due to an early infiltration of Aurignac culture, as it appears on various levels at Le Moustier itself. Its most characteristic implement is a knife formed from a stout flake with straight cutting-edge and with the back or opposite edge curving towards the point and dressed transversely as though for a finger-rest. It is the predecessor of the Châtelperron and Gravette points (fig. 126) which show progressive refinement in the period now called after Aurignac (Haute Garonne, about forty miles south-west of Tou-

louse). The 'station' consists of a small cave finally used for sepulchral purposes, and a terrace in front, overlooking a stream about 45 ft. below. Under the floor were found quantities of mammalian bones; and at the base a layer of cinders and charcoal several yards square and 6–8 in. thick. The woolly rhinoceros and aurochs were among those that had been gnawed by hyaenas; and marrow-bones of the herbivores were generally found split in a uniform manner, some few showing the action of fire. Teeth were found also of the cave-bear and mammoth, and reindeer-antler had been utilized for various purposes (Case 110). The Châtelperron point of lower Aurignac consists of a blade with straight cutting-edge along one side and a 'battered' edge opposite for applying pressure. In the middle stage the bone point with split base

*Fig. 126.—Abri Audi, Châtelperron and Gravette 'points'. ($\frac{2}{3}$)

Fig. 127.—Bone point with split base, Gorge d'Enfer. ($\frac{1}{3}$)

(fig. 127) which was perhaps the predecessor of the needle is specially common, with the 'busked' graver (fig. 129, *a*); and many of the blades have notches, sometimes two opposite forming a waist. The final stage is marked by the evolution of the Gravette point (like the blade of a pen-knife) from that of Châtelperron; a kind of shouldered point, and a primitive tanged arrow-head, named after *la Font Robert*. Attention is also directed to a pointed flake from the Aurignac site that is rubbed almost enough to be called 'polished': it came from the Busk collection.

The cave or rock-shelter of Cro-Magnon is situated in the limestone cliff overlooking the valley of the Vézère, near Tayac, Dordogne; and was discovered in 1868 during the construction of the railway. Five skeletons were found by the labourers, but only three were preserved; casts of the skulls are shown, in Case 113, of an old man, a male adult, and a woman who had been seriously but not fatally wounded on the forehead by a blow from a cutting instrument. The bodies had not been buried, but lay on the floor of the shelter, which was at that time only about 4 ft.

from the overhanging rock. It had been raised to this level by successive accumulations of débris separating the layers of charcoal and hearthstones that show human occupation at intervals; and as débris to the depth of 15 or 20 ft. had accumulated above the rock-ledge since the bodies were deposited, there is no doubt of their palaeolithic date. Physically these remains are of interest as showing that what is known as the Cro-Magnon race had large as well as very long heads (the mean cephalic index is 73·41: see p. 97); and the cranial capacity of the woman surpasses the average capacity of male skulls of to-day. In stature they were also above the modern average, the old man being upwards of 6 ft. in height; but there are also indications, in the projecting lower jaw and broad face, of a low state of development. This was the artistic race which dominated Western Europe in the Aurignac period and originally came from Africa.

Fig. 128.—Double end-scraper, Cro-Magnon. ($\frac{1}{2}$)

With the human remains at Cro-Magnon were found about 300 marine shells (including the periwinkle), now common on the Atlantic coasts; also several perforated teeth, perhaps worn like the shells on a string round the neck. Worked antlers of the reindeer were discovered, but this animal was rare on the site in comparison with the horse; and the fauna also comprised the mammoth, cave-lion, and cave-bear, wolf and pouched marmot. A good specimen of the double end-scraper, consisting of a flint-flake rounded at both ends on one face only by use as a plane (*grattoir*) is here illustrated (fig. 128), and the conical *grattoir Tarté* typical of the Aurignac period is here represented by an unusually large specimen (Case 109).

Gorge d'Enfer (Cases 109, 110) is a ravine opening into the Vézère valley a little below Laugerie, and the caves have been explored on several occasions. The date of their occupation by primeval man is indicated by points of bone and antler, with split base perhaps to receive the shaft (fig. 127). This is one of the main characteristics of the middle Aurignac period, and its presence here shows that Gorge d'Enfer was occupied in the same period and by the same race as Cro-Magnon. The conical plane also occurs here, as in the two preceding caves; and the manufacture of bone tools shows an advance on Le Moustier, where that material was scarcely used at all. Though rare in England, the graving tool (*burin*) is abundant in the French caves and went through so many transformations that a summary must be given here.

Characteristic of the middle phase of Aurignac is the busked

graver (*burin busqué*), which is a flake so pointed as to produce a U-shaped groove in materials like bone, wood, and ivory. For this a comparatively thick flake is required: the end (away from the bulb) is fluted transversely (direction 1 in fig. 129) and a slice detached by a blow at right angles (*coup de burin*), beheading the busked or fluted surface, and leaving a convex edge (direction 2 in fig. 129). Sometimes the transverse fluting is stopped by a small notch, so that the splinters detached in sharpening should not travel too far. In spite of its elaboration, this is an early type of graver; and though 'screw-driver' points have been noticed on some flakes of Le Moustier date, the graver technique was not perfected till Aurignac times, when carving and engraving flourished and tools were needed to cut an outline or sever by grooving. The essential element was a sharp point, strong enough to resist pressure; and the two points of a screw-driver end fulfilled those conditions, producing a V-shaped groove. When this prepared edge is in or

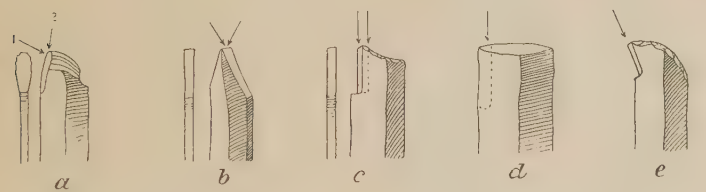


Fig. 129.—Diagram of graver-types, French caves.

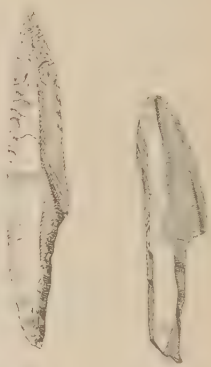
near the axis of the blade, it is called in French *bec de flûte* (fig. 129, *b*), and two slices are taken off the end of the blade obliquely, in the direction of the two arrows. When the slice is detached by a blow delivered near the angle and parallel to the axis, an angle-graver is produced, and the end of the flake abutting on the slice can assume various forms. Sometimes it is worked like a hollow scraper (fig. 129, *c*), which is gradually encroached on by repeated sharpening, a fresh slice being detached on each occasion; in other cases, a transverse fracture of the blade is utilized (fig. 129, *d*). A late variety (La Madeleine) is the 'parrot-beak' (*bec de perroquet*), with a 'battered back' curving round to a point, which is made into a graver by means of a very short slice, sloping inwards (fig. 129, *e*).

The typical site of the succeeding cave-period is Solutré, in the department Saône-et-Loire (Case 111). The Cros (Clos)-du-Charnier, as the site is called from the enormous number of bones discovered, is situated on a small plateau at the base of a limestone escarpment, and unlike most palaeolithic sites, was an open-air settlement, sheltered to some extent on the north by the cliff. Remains of various stages of the palaeolithic period are here found over a very small area, and though the predominant type of flint implements

(the leaf-shaped lance-head, as fig. 130) is distinct enough for purposes of classification, the site is in some ways not so typical as Laugerie Haute, which has been adopted by some authorities. Several landslips have occurred on this spot, but the relative position of the palaeolithic layers is said to have been unaltered. There are mounds of kitchen refuse, reindeer bones, and flint implements, but especially burnt bones of the horse, which form walls or ramparts, but as these contain the Gravette and Font Robert 'points', the horse may be assigned to the close of Aurignac rather than to Solutré: horse bones also occur in large quantities around and underneath prehistoric fire-places, most of which are

(⅔) (½)

Fig. 130.—Leaf-shaped points, Laugerie Haute.



(⅔) (½)

Fig. 131.—Shouldered points, Les Eyzies.

surmounted by interments of unburnt or partially-burnt human bodies. There are also the reindeer and mammoth, deer, urus, fox, wolf, saiga antelope, and cave-lion, but the great carnivores only occur in the bed below the fire-places, and the wild boar and rhinoceros do not occur at all. The fauna is characteristic of the steppe and forest rather than the tundra, and has been taken to mark a climatic improvement in Aurignac and Solutré times, termed 'interglacial' in our table (p. xiv). It is evident that the Aurignac and Solutré populations lived in the open air at Solutré, in itself an indication of moderate temperature; and one of the Aurignac skulls recently found here has a cephalic index of 83·24 (brachycephalic). Apart from a preliminary stage called Proto-Solutré, when flakes received shallow dressing on the bulbar face (fig. 57), the Solutré industry is now divided into two periods, the earlier marked by the laurel-leaf points (fig. 130) and the later by the points with shoulders (*pointes à cran*, fig. 131), which are, however, not found at Solutré itself.

Laugerie Haute (Case 111), is in many respects a more suitable type-locality than Solutré, as the remains are more complete, and were found underlying a La Madeleine deposit. Flint working had by this time reached a high pitch of excellence, only to be surpassed in the Neolithic Age ; and the most characteristic form of the period is the leaf-shaped point (fig. 130), which may have been used, according to size, as an arrow-head, lance-head, or even a knife. The flint-flakes used for scraping skins and other purposes were also finely worked and had acquired a definite form (fig. 132), rounded in use at one or at both ends by chipping on one face only. The double planes are also common in the succeeding period, when the single ones were formed out of longer flakes.

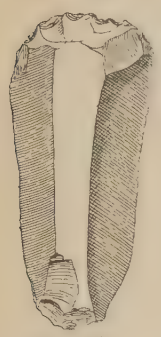


Fig. 132. — End - scraper on blade, Laugerie Haute. (⅔)

The cave of Badegoule (Badegols), near Beauregard, Dordogne (Case 112), faces the south at an elevation of about 250 ft. above the Cerne, a small tributary of the Vézère ; and on a terrace in the rock, below the cave, was found breccia resting against the cliff, while the ground in front was strewed with worked flints, bones and teeth, including those of the horse, ox, and reindeer. Some of the implements were chipped in leaf-form, and point to Solutré, but La Madeleine is also represented. Several flakes used as end-scrapers are shown, also flint cores from which blades were struck by means of hammer-stones.

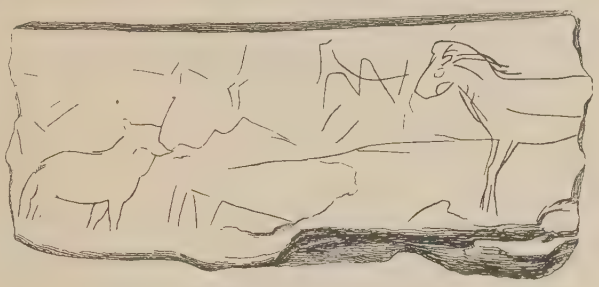


Fig. 133.—Engraving on schist, Les Eyzies. (⅔)

The cave of Les Eyzies, near Tayac, Dordogne (Cases 110, 112), has been considered to mark the transition between the Solutré and La Madeleine periods, as the worked flints, which include the characteristic point with shoulder (fig. 131), were far outnumbered by lance or harpoon heads of La Madeleine type, made of reindeer-antler. The prehistoric site is situated in the face of the limestone cliff (see drawing in Case 120), at an elevation of 120 ft. above the present river-level ; and is on the north side of the valley of the Beune, a stream that joins the Vézère about half a mile lower down the valley. Les Eyzies has produced examples of engraving (Case 119 and fig. 133) of the kind more usual at Laugerie

Basse and La Madeleine; and the quartzite pebbles with hollowed faces (fig. 134) are also more common in the succeeding period. Their use is uncertain; but, though it has been held that they served as mortars for grinding haematite or red ochre (specimens in Cases 113, 116-17), it is also possible that they were anvil-stones for flint-working; and similar specimens of the Neolithic Age found in Ireland are shown in Case 77. Among the flint implements from this site may be noticed the graver (*burin*) with transverse chisel edges sometimes at both ends (fig. 135), used for engraving on bone or ivory; a curious type of borer, the point of

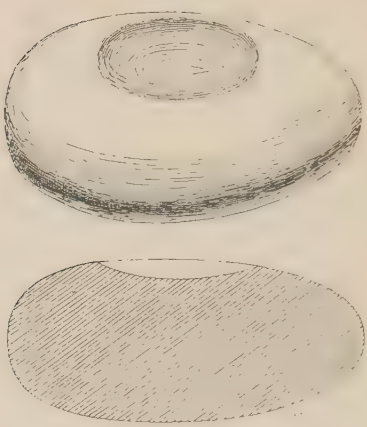


Fig. 134.—Quartzite pebble with hollow, Laugerie Basse. ($\frac{1}{2}$)

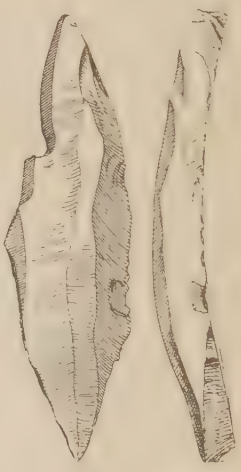


Fig. 135.—Double graver, Les Eyzies. ($\frac{2}{3}$)

which is a narrow spout-like curve laboriously worked (fig. 136); and a carinated plane (*caréné*) with characteristic fluting at the end (fig. 137). There is also one tanged point like an arrow-head, that is called after the Font Robert cave near Brive (Corrèze), of late Aurignac date. A block of breccia or solidified floor-deposit from this cave, showing the manner in which the relics were found, is exhibited on the floor of this room.

The rock-shelter known as Laugerie Basse was explored by Messrs. Lartet and Christy and others, and is situated on the right bank of the Vézère, about 80 yds. from the river, and about 25 ft. above its level. Few sites have yielded more numerous examples of palaeolithic art; and the analogy to La Madeleine is rendered all the more striking by the absence of the Solutré type of flint implements that occur in the neighbouring site of Laugerie Haute. Carved and engraved representations of the human

figure have been found at Laugerie Basse, among which may be mentioned the hunter of the aurochs ; but more artistic work may be seen in the sketches of animals (fig. 138) exhibited in Case 119. It was here also that the crushed man was discovered in a

Fig. 136.—Flint borer, Les Eyzies. ($\frac{2}{3}$)

Fig. 137.—Carinated plane, Les Eyzies. ($\frac{1}{2}$)

Fig. 138.—Head of ibex, Laugerie Basse. ($\frac{2}{3}$)

La Madeleine stratum : a huge boulder had evidently broken the vertebral column, and the ornaments found on the body were clearly of the palaeolithic period. Specimens of perforated teeth, &c., are exhibited from this site (fig. 139). Phalanges of the reindeer (no. 5) are frequently found with a hole at one end, and have been considered whistles, but the bone may have been broken through at this the weakest spot by the teeth of hyaenas.

In Cases 114, 115, are exhibited in glass-covered boxes remains from the rock-shelter called Montastruc 20–25 ft. above the river Aveyron and 60 ft. from its bank at Bruniquel (Tarn-et-Garonne). They form part of the large collection acquired from M. Peccadeau de l'Isle, the more important carvings being in Case 114. These will be described in connexion with the series mounted on several boards in Cases 113–15, and discovered in 1863–4 by the Vicomte de Lastic St. Jal in excavating the cave-dwelling known as Trou des Forges on the right bank of the river Aveyron, a little above

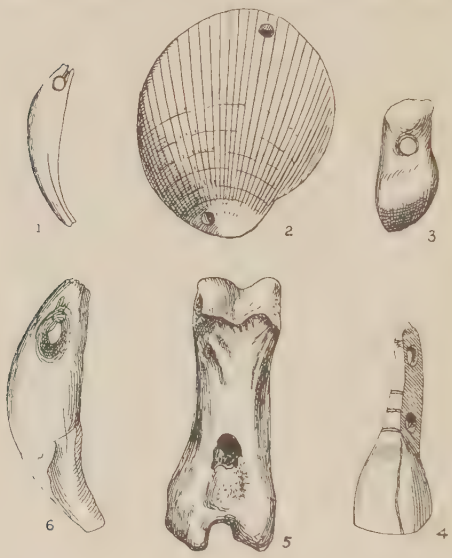


Fig. 139.—Perforated teeth, shell and bone, La Madeleine and Laugerie Basse. (⅔)

Fig. 140.—End-scraper and graver, Bruniquel. (⅔)

the same village. The entrance to this cavern is in the face of the cliff, about 40 ft. above the bed of the river, the floor being composed of stalagmitic breccia, enclosing water-worn stones from the bed of the river, and also pieces of the reddish limestone of which the cliff is formed. The upper part of the breccia, 4–5 ft. thick, was black with charcoal, and the lower part, 3–4 ft. thick, was plain red earth ; but every part of the breccia contained remains of the wolf, rhinoceros, horse, reindeer, stag, Irish elk, and bison, together with implements of flint and bone.

The remains belong to the period of La Madeleine, and among the flint or chert implements should be noticed a number of combined scrapers and graving-tools, rounded at one end as in the Solutré period, and pointed at the other on one side (fig. 140), perhaps for the purpose of engraving bone or antler.

Javelin-heads of reindeer-antler are common at this date, and many are here shown either with plain points, the butts cut like a wedge for fixing in the shaft (fig. 141), or barbed like a harpoon on one or both sides (fig. 142), and different stages of La Madeleine

Fig. 141.—Bevelled harpoon-head, Bruniquel. ($\frac{2}{3}$)

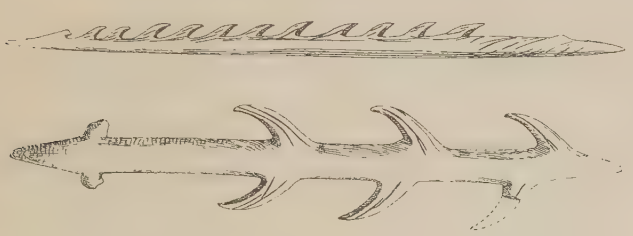


Fig. 142.—Barbed harpoon-heads, Bruniquel. ($\frac{1}{2}$)

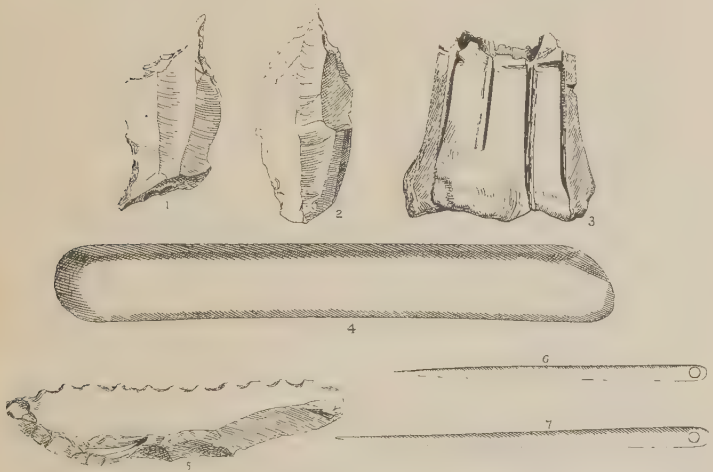


Fig. 143.—The manufacture of bone needles, Bruniquel. ($\frac{1}{1}$)

are marked by the several varieties. Some specimens exhibit remarkably fine work, but the dexterity of palaeolithic man is perhaps best attested by the bone needles of the period found at Bruniquel and elsewhere. Specimens from the Trou des Forges and Montastruc are shown, together with tools and material used in their manufacture. A splinter was first taken from the bone (fig. 143, no. 3) by means of a graver and then rounded by scraping

with a serrated flint (no. 5). The tapering point and smooth surface were made by rubbing with a sandstone burnisher (no. 4), and the eye drilled with a pointed flint (nos. 1 and 2). Needles of various sizes, probably for sewing skins, were thus produced (nos. 6, 7), and examples have been found showing that a second eye was sometimes drilled when the first was broken. A bone piercer may have been used to perforate the tougher skins, but the Eskimo are known to manipulate hides in such a manner as to render possible a direct use of their needles of bone or ivory.

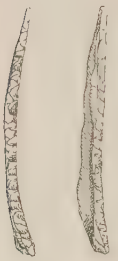


Fig. 144.—Blade with battered back, Trou des Forges. ($\frac{2}{3}$)

Mounted on a board are diminutive implements (fig. 144) from Bruniquel, with the back or thicker edge blunted by chipping, perhaps to provide a resting-place for the finger when in use. This type is common in the later Cave period, and known by the French term, *à dos abattu* (battered back).

The engraved bones from this site are among the best known, the exhibit including part of a horse's rib with three horses' heads on both sides (fig. 145); part of the rib of a deer, engraved with heads of reindeer and wild goat (fig. 146); and on the same board a portion of the wing-bone of a bird with a reindeer's head in outline; also the drawing of a fish. On a board are some interesting carvings in the round of horses' heads, probably portions of spear-

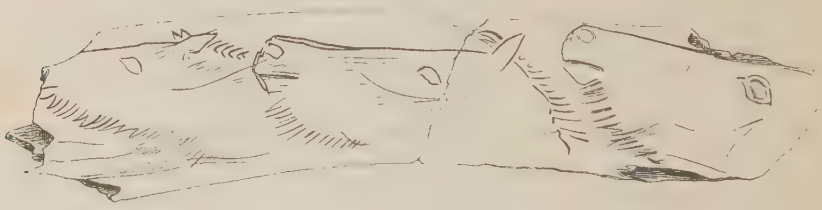


Fig. 145.—Engraved bone, Trou des Forges, Bruniquel. ($\frac{2}{3}$)

throwers (fig. 147), such as have been found fairly complete at La Madeleine (no. 3), and are used at the present day by savage tribes on the N.W. coast of America (no. 1) and Australia (no. 2). The throwing-stick is used to increase the leverage of the arm, the butt-end of the missile resting against the peg or hook. These are all from the Trou des Forges; but more remarkable examples of palaeolithic art were discovered at the rock-shelter of Montastruc.

The remarkable carving (pl. IX) in Case 114 was found in two pieces almost together on this site; and a back view is provided by means of plaster casts. That they belong together and formed the point of a carved tusk was shown in 1905 by the Abbé Breuil,

PLATE IX.—POINT OF MAMMOTH TUSK CARVED WITH REINDEER, MONTASTRUC, BRUNIQUEL, FRANCE.

(Case 114, *see* p. 138)

whose work on the cave-deposits, their engravings and wall-paintings has considerably increased our knowledge of later palaeolithic man. These carvings of reindeer are in mammoth ivory, and are of great artistic merit; while the mammoth (fig. 148), carved in reindeer-antler and shown on the same shelf, does not appear to be so faithful a representation. The trunk reaches the fore-feet; the tusks, which were for the sake of convenience placed along the blade, are somewhat out of place; and the blade and tail are now missing, though the latter

Fig. 146.—Engraved bone, Trou des Forges, Bruniquel. ($\frac{2}{3}$)

Fig. 148. — Mammoth carved in the round, Bruniquel. ($\frac{1}{3}$)

Fig. 149.—Engraving on pebble, Montastruc, Bruniquel. ($\frac{1}{3}$)

was found in place and resembled the hook at the end of a spear-thrower (as fig. 147), but would not have been strong enough for this purpose.

On the top shelf is an interesting series of sandstone pebbles with sketches made by palaeolithic man of the animals around him. For purposes of exhibition, the outlines have been filled in with white, but one specimen is left in its original condition. Perhaps the most attractive is the figure of a reindeer (fig. 149), the legs being drawn on the opposite side of the stone. The contrast between two drawings of a bovine animal should be noticed

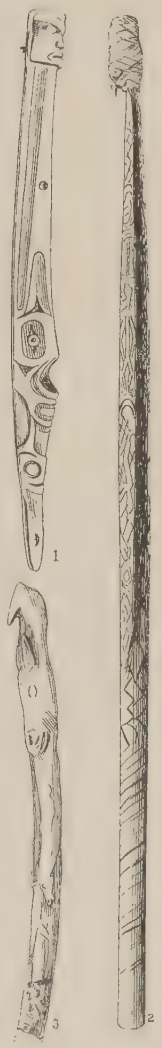


Fig. 147. — Examples of spear-throwers. ($\frac{1}{5}$)

Fig. 150.—Engraved stone, Montastruc, Bruniquel. (½)

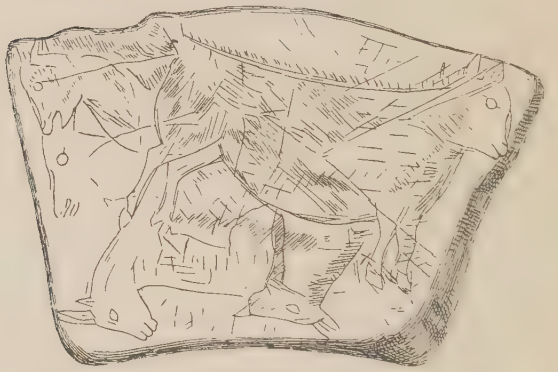


Fig. 151.—Engraved stone, Montastruc, Bruniquel. (⅔)

Fig. 152.—Engraved stone, Montastruc, Bruniquel. (¼)

(figs. 150, 151), and the largest stone of the series has sketches of various animals, including the goat (fig. 152).

The figure of a horse (fig. 153) is engraved on a piece of reindeer-antler, and attention may be drawn to a remarkable disk of horn with herring-bone engraving and serrated edge (fig. 154): it was probably a personal ornament, and may have been worn, like the perforated teeth, on a necklace, but the loop is now wanting.

In Case 119 are engravings on schistose stone from Les Eyzies (fig. 133); a graceful head of an ibex on reindeer-horn from Laugerie Basse (fig. 138); and the unmistakable figure of a glutton (fig. 155) from one of the Dordogne caves, a further indication that the climate

Fig. 153.—Horse engraved on bone, Montastruc. ($\frac{1}{1}$)

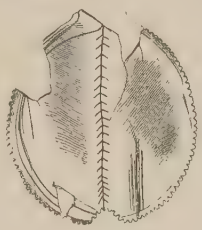


Fig. 154.—Bone ornament, Montastruc. ($\frac{1}{3}$)

Fig. 155.—Engraving of glutton, Dordogne. ($\frac{1}{1}$)

during the period of La Madeleine was of a sub-arctic character. At the back are reproductions of engravings in other collections, including the well-known figure of a mammoth on a piece of ivory, presented to the Natural History Museum at Paris by Mr. Christy. In the restoration of the mammoth, the tusks should curve inwards at the point.

The rock-shelter of La Madeleine (Cases 116–18) has provided a name for this closing epoch of the Palaeolithic Age. Arctic conditions are again indicated, and the abundance of the banded lemming in some localities (as at Sirgenstein, west of Ulm) justifies the connexion of this period with one of the glacial phases of Penck, but there is much discussion as to its identity. In France the Bühl stadium is generally preferred; but most of the German authorities are in favour of Würm, as in table on p. xiv. The working of bone and horn was at its best, but the manufacture of flint tools and weapons had declined, being distinctly inferior to

products of the Solutré period. The settlements of the population were now sometimes in the open country, but the typical site is on the right bank of the Vézère, at the foot of the cliff, and not far from the ancient castle of La Madeleine. It is about 30 yds. from the river, and the upper surface of the deposit is not more than 20 ft. above the level of the stream, being, like Montastruc at Bruniquel, within reach of floods. In the recess below the overhanging rock the beds attained a total depth of 8–10 ft., the upper part being principally rubble from the roof, and resting on layers of refuse resembling the kitchen-middens of a later period. The animal remains corresponded to the fauna of Les Eyzies, and interspersed with them were hearth-stones, rubbing-stones and

Fig. 156.—End-scraper on blade, La Madeleine. (¼)

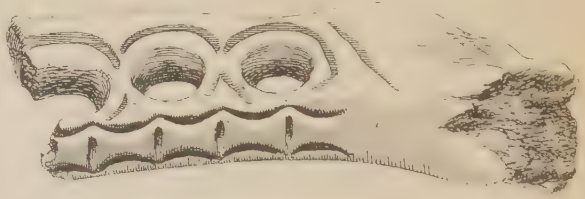


Fig. 157.—Part of perforated antler, La Madeleine. (⅔)

Fig. 158.—Perforated reindeer-antler, La Madeleine. (⅓)

hollowed pebbles, together with flint flakes and cores and some remarkably long blade-scrapers (fig. 156) characteristic of this period (see specimens on top shelf: the bottom shelf contains stones similar to those just mentioned, from Bruniquel).

The exploration of this site by Messrs. Lartet and Christy resulted in the discovery of a large number of antler implements, conspicuous among them being the somewhat mysterious *bâtons de commandement*, formed of an antler with one or more circular holes (fig. 157), and supposed to have been emblems of authority or arrow-shaft straighteners: many of them have engravings of animals, especially the horse (fig. 158). A number of small pieces of reindeer-antler on the second shelf also have representations of animals such as the reindeer (fig. 159), and possibly of the human arm (fig. 160); also specimens with geometrical and other designs,

the 'bamboo' pattern being shown in fig. 157. At the end of this shelf are lithographs of some of the more important engravings in this and other collections; and many of the objects from this site, generously given by Mr. Christy to the French Museum of National Antiquities (St. Germain-en-Laye), are represented by casts on the third shelf.

The following division of La Madeleine was suggested by the Abbé Breuil, and is based on changes in the industry, though six stages have now been established by the same authority.

1. Lower, without harpoons, some needles (fig. 143), ornamented bone plates (fig. 154), chisel-ended lance-heads (fig. 141), and flint-work resembling upper Solutré.

Fig. 159.—Bone engraving of reindeer, La Madeleine. ($\frac{1}{2}$)

Fig. 160.—Engraving of human fore-arm, La Madeleine. ($\frac{2}{3}$)

2. Middle, with harpoons, generally one row of barbs (fig. 142); harpoon and lance-heads with forked base; half-round antler ornamented with figures; end-scrapers (blades) and graving-tools (fig. 129), the sides rarely retouched. Represented at Bruniquel and Laugerie Basse, and corresponding to Piette's Gourdan stage.

3. Upper, harpoons with double row of barbs common, chisels with cylindrical shaft. Engraving deep and careless, degenerating into mere ornament. End-scrapers (blades) and minute worked flakes sometimes called microliths or pygmies. Subsequent developments of this culture are noticed on p. 146.

In Case 120 are pencil sketches showing by means of a red cross the position of the cave-dwellings of Le Moustier and Les Eyzies; also the cliff at Tayac and the castle of Les Eyzies, all in the Dordogne, France. Also reproductions of engravings on reindeer-horn chiefly from La Madeleine and nearly all in the collection.

This series illustrating palaeolithic engraving and sculpture calls for a few words as to the development of primitive art. The use of bone for industrial purposes was very rare in the period of Le Moustier, but became common in the succeeding Cave period of Aurignac, the lozenge-shaped point with split base being then the typical bone implement. The earliest engravings seem to be those found in an upper level of this period at the Trilobite

grotto, Arcy-sur-Cure (Yonne): reindeer-bone engraved with a plant, and a schist pebble with a woolly rhinoceros and capridae. The late M. Piette pointed out that sculpture in the round preceded and gave rise to engraving on the flat, and this is true with some modification. His ivory period (*éburnéen*) corresponds to Aurignac, and is marked by sculptures in the round of archaic style representing human figures, chiefly women, whereas a later and more developed style is seen in similar statuettes of animals. The material at this stage is generally mammoth ivory, but crystalline talc, steatite (soap-stone), bone and reindeer antler also occur. Human figures (always nude) were specially plentiful at Brassempouy (Landes), and figures of animals at Mas d'Azil (Ariège), the animals being almost exclusively of La Madeleine date. Sculptures in the round were finished with engraved lines to represent hair and other details, and the next step was the use of low relief, generally on reindeer-antler, the hard portion of which was not thick enough for high relief. The outline was often engraved, and the ground then scraped away to throw it into relief, the work being finished with the flint graving-tool which is commonly found. The execution of low relief on thin plates of ivory inevitably led to pure engraving, examples of which are much more numerous than sculptures in the round, and, in contrast to the archaic style, often represent groups of animals and hunting scenes. Animals are generally shown in profile, and the human figure is rarely and imperfectly portrayed, the simian element being perhaps exaggerated by the artist. Engravings on stone predominated in the Gourdan cave (Haute Garonne), and a few specimens on schist and pebbles are exhibited from other sites. The animals represented are frequently of extinct species, and are sometimes drawn with remarkable accuracy, the hairy coat of the mammoth being apparent, and two breeds of horses being distinguishable. M. Salomon Reinach has pointed out that practically all the animals that served as models were useful to hunters and fishers, who encouraged them by sympathetic magic, whereas the undesirables, such as the lion, tiger, hyaena, jackal, wolf and serpent, are conspicuously ignored.

Though no reproductions of cave-paintings and wall-engravings can at present be exhibited for want of space, a note on these recently discovered masterpieces of prehistoric man must be added here in connexion with sculpture and engraving. There are now at least twelve caves in France and north Spain where drawings of animals and men have been noticed on the walls, the most famous being those at Altamira (near Santander, Spain), and Combarelles, Font-de-Gaume, and La Mouthe, all in the Beune valley near Les Eyzies, Dordogne. Of these Combarelles contained wall-engravings of over 100 animals, fourteen being of the mammoth; and Font-de-Gaume paintings in ochre and black of 77 subjects, comprising

49 aurochs, 4 reindeer, and 2 mammoth, as well as certain geometrical patterns. This phase of art has been closely studied by the Abbé Breuil, M. Cartailhac and others, the succession of the various styles being as follows :

1st Stage (late Aurignac and early Solutré)—Engravings : broad and deep outlines, then silhouettes, very deeply cut with few details. Paintings : black lines, continuous or dotted, then monochrome outlines of animals, without modelling or many details.

2nd Stage—Engravings : still broad and deep, but more life-like, improving ; the body scratched to show hair, &c., or enclosing colour-zones. Paintings : lines red or black, developing into tints spread over the body ; then figures entirely painted in black, fully modelled, outlines sometimes engraved, and high-lights scraped.

3rd Stage (late Gourdan period)—Engravings : generally small, shallower, but still broad outlines, some figures admirable in detail, expression and proportion. Paintings : colour excessive, filling the whole space and spoiling the modelling, flat tints, showing a decline.

4th Stage—Engravings : simple graffiti, barely intelligible, detail exaggerated at expense of expression and general effect. Paintings : modelling recovered by use of polychrome, details in black on brown or red ; engraved outlines and details, modelling by scraping and washes.

5th Stage—Engravings and figure paintings cease ; but at Marsoulas (Haute Garonne) friezes, branches, dotted lines and spaces occur, also cross in circle, much like the painted pebbles of Mas d'Azil.

The sites enumerated above are among the most important in France and have become classical since the publication of Lartet and Christy's *Reliquiae Aquitanicae*, to the plates of which reference is made under each illustrated specimen on the boards. A few other caves of less importance are represented in Cases 109–19, viz. :—Massat and Grotte de la Vache, Ariège ; Lourdes, Hautes Pyrénées ; Rébenac, Basses Pyrénées ; Tour du Diable, Bourdeilles, Dordogne ; Pey de l'Azé, St. Léon-sur-Vézère, and Grotte de Lacombe, Dordogne ; chez Pouré, Brive, Corrèze ; Grotte des Fées, Châtelperron, Allier ; Grotte des Fées, Arcy-sur-Cure, Yonne ; and in the Charente, Combe à Rolland, Veuil ; Grotte de Montgaudier, Montbron ; Grotte de la Chaise, Vouthon ; and Monthiers, Blanzac.

A few specimens in Case 119 come from Mas d'Azil, Ariège, the cavern that supplied evidence of transition from Palaeolithic to Neolithic, and abolished the *hiatus*. Though the fruits found there by Piette in 1887 were no doubt taken down by burrowing animals, a distinct culture is now recognized, the chief items being broad

and flat harpoon-heads of stag's antler with perforated base; and painted pebbles with designs now thought to be conventionalized representations of the human form (p. 17). Some of the large flint-types of La Madeleine survived, but the tendency was towards microliths or pygmy geometric forms (p. 89). The harpoon-head from Béthune (fig. 161) is of Maglemose type and is not the only one found there. A link is thus provided between France and Denmark in epipalaeolithic times.

The neolithic period of France is represented in the next eight Cases. The most important groups in Case 121 are from burials: (i) at Tours-sur-Marne with polished flint celts either pointed at the butt or merging into the thin-butted type, some well-shaped flint blades, several transverse arrow-heads (*petits tranchets* as fig. 181), and pierced shells and teeth as pendants: fragments of human bone discoloured by the bronze bead adjoining them point to the Aeneolithic period, and suggest that Denmark remained neolithic much longer than France. (ii) Lignon, Marne, with

Fig. 161.—Barbed harpoon-head, Béthune, France. (½)

animal bones split for the marrow, and the lower jaws of several children, one jaw being exhibited with flakes, ground stone axes and incised bones, the whole showing traces of fire: cremation started locally in the Neolithic (p. 148). (iii) Cloye, Marne, with a brown chert flake and a necklace of beads made from disks of pectunculus shell.

Flint factory-sites are represented by series from Girolles, Loiret (pale brown flint); Villes and Mormoiron, Vaucluse (dark brown); and Sommevesle, Marne (white). The polished celts of Brittany and S. France (Vaucluse and Drôme) are much alike, small and stumpy, subtriangular, pointed at the butt, and made of various stones, fibrolite, chloromelanite, &c., that could only be shaped by grinding. Flints celts from the Aisne, Marne, and Aube (Morel collection) are in a drawer of Case R.

Two caves in Dépt. Drôme have produced groups of objects that may not be strictly contemporary (Case 122): from La Rochette, where the body lay under a heavy stone, come fragments of pottery with vertically perforated lugs or handles, spindle-whorls, and arrow-heads, the last being surpassed by those from the Grotte de Mirabel, where long blades and a fragment of beaker were also found: abroad this type of pottery is generally classed as aeneolithic. Many other arrow-heads are exhibited, presumably from the surface, the majority being tanged but not barbed.

Pontlevoy is a recognized palaeolithic site (Case 105), but from the surface come also some roughly made end-scrapers (*grattoirs*), in some cases with steep ends. Fibrolite celts from Gergovia plateau near Corent, Puy-de-Dôme are particularly small, and resemble those from Asia Minor (Case 143).

Unpolished celts in the next Case (123) from Montières, Amiens, and other sites are of nearly all types discussed elsewhere (pp. 101, 157); but attention may be called to the circular armlets of schist, shell, and stone (the last incomplete) from the Morel collection, and polished sling bolts, one of which is labelled Drôme. There are some unusually long blades and a good knife of Pressigny flint from the Seine, published by Sir John Evans in 1865.

Some individual specimens are worthy of notice in Case 124.

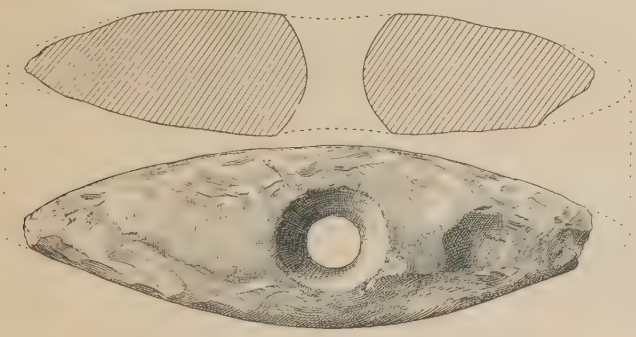


Fig. 162.—Perforated flint pick, Paris. ($\frac{1}{3}$)

The double pick (fig. 162) presented by Sir Ray Lankester has been often published and is peculiar in material, form, and perforation. Stone axe-hammers and other weapons meant to be hafted at right angles are bored in different ways according to their date (p. 107); but this specimen is of flint (rarely chosen for this purpose), is pointed at both ends, and has a natural perforation enlarged for the haft (p. 107). It was found about 14 ft. deep near the Seine bridge of the Grande Jatte, Neuilly, Paris. A fine white celt of Scandinavian proportions (11·7 in. long) has the butt and squared sides characteristic of the Dolmen period, and was found at Vailly, Aisne. Triangular specimens of jadeite or similar rock from Les Eyzies (Dordogne) and Pleurs (Marne) are of the type associated with Brittany dolmens and occasionally represented in Britain (p. 100); and the boat-shaped stone axe from Charmont (Marne) is obviously a Scandinavian import and is now considered later than the Neolithic, whereas the basalt celt 10 in. long, with pointed butt and circular section, found under Malzéville bridge (Meurthe), belongs to an international

type dating from the earliest days of polished stone. A few specimens from an extensive factory of crystalline sandstone in the forest of Montmorency, between St. Leu and Chauvry (Seine-et-Oise), have been presented by Miss Layard, but the date is at present uncertain (probably Robenhausen). The site has been known since 1910 and reaches a height of 574 ft. above the sea, where there is an outcrop of the rock. Though the types are various, a rough prism, with pointed or chisel-end, was evidently required in quantity, the length ranging from $4\frac{3}{4}$–8 in.

At the top of Cases 125, 126 are more polished stone celts, generally of small size, collected in Brittany, where megalithic remains such as dolmens, chambered barrows, cromlechs (circles), and menhirs (standing stones) are abundant. These are regarded in France as marking the close of the neolithic period, in spite of the absence of copper with the burials, that metal usually heralding the advent of bronze; and the celts, which are often made of rare materials, are found associated in the graves with callaïs beads and pendants (fig. 163), flint implements and cores, vessels and spindle-whorls of pottery, and rarely ornaments of gold. The mode of burial was not uniform at this period, cremation being introduced here before the beginning of the Bronze Age (p. 146). There can be no doubt that the dolmens and chambered barrows were ossuaries opened from time to time for the deposit of human remains, so that the burials do not all necessarily belong to the same stage of culture. Two or more layers of deposits have been noticed in these megalithic chambers, not only in France; and it is clear in certain English cases that the Bronze Age and even later people made use of the tombs of their predecessors.

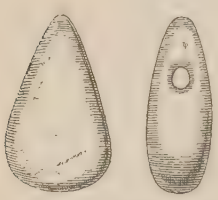


Fig. 163.—Callaïs pendant, Locmariaquer. ($\frac{1}{2}$)

These Cases contain objects from the barrows and dolmens of France, chiefly from the Morbihan collection of Mr. W. C. Lukis; and it should be remembered that the term 'dolmen' is used in Brittany not only for structures with a single cap stone, but for tombs with entrance-passage and sometimes lateral chambers, all originally covered with earth or stones; in the latter case the mound is called a cairn or *galgal*.

From a chambered long-barrow north of the stone avenues at Kerlescant, Carnac (plan adjoining), come fragments of pottery with herring-bone and finger-nail decoration, also parts of a zoned beaker (drinking-cup), a polished celt, flint arrow-heads and flakes, a pendant and hammer-stone, all apparently of late neolithic (Carnac) period. A complete beaker of calyx form (French *calici-forme*) is shown, with a different ware spirally ornamented, from a dolmen at Quelvezin (fig. 164), and another similar from the

Kergavat dolmen between Carnac and Plouharnel. In a dolmen on Mané-Remor, Plouharnel, were found flints, quartzite, pottery with a lug, and a small cup with the lug pierced vertically. The larger pendant of callaïs (resembling turquoise) (fig. 163) is from a dolmen, Mané-er-Hroeck, Locmariaquer; and beads of the same material, with a gold ferrule, small celts, flint arrow-heads and flakes, and stone pendants were found in a dolmen at Kerlagat, Carnac. An interesting group from the north dolmen, Mané-er-Kloc'h, Locoal-Mendon, includes small ground celts, pottery, a large flint flake, and a piece of Roman glass, the last showing that the tomb was entered in Roman times. A dolmen on Mané Bras, north of the stone avenues at Erdeven, Morbihan, produced two polished celts and fragments of a zoned beaker; while from other parts of

Fig. 164.—Zoned beaker from dolmen, Quelvezin, Carnac. ($\frac{1}{4}$)

France are beads and pendants of shell, bone, and tooth from a dolmen in Dépt. Lozère, and tanged flint arrow-heads from dolmens near Rodez, Aveyron. A view of the well-known Dolmen du Marchand near Locmariaquer, Brittany, shows the interior with carvings on the roof and end-stone, also a plan of the whole structure, which consists of a round chamber, approached by a passage, much like the chamber in West Kennet long-barrow (fig. 91).

The Mont Ubé passage-grave in Jersey was not properly explored, but is represented (at top of Case) by a series including a flint pick, transverse arrow-head, and some curious pottery, which may or may not be contemporary. A few flint balls, probably hammer-stones, are shown from Dépt. Eure, with 'pot-boilers'—lumps of flint used to heat water: they were first placed in a fire, then removed and dropped into receptacles (of stone, wood, or hide) in which water could thus be raised to boiling-point. A type-series of material from a factory-site at Girolles, Ferrières, Loiret, given by Dr. Capitan, includes celts, 'rough-outs', and flakes all of a peculiar flint with brown veining.

Cases 127, 128 are filled with heavy cores or nuclei (known locally as *livres de beurre*, from a supposed resemblance to pounds of butter) and long flakes from Grand-Pressigny (Indre-et-Loire), a core from which a blade has been struck being illustrated (fig. 165). The chalk of Touraine contains bands of honey-coloured cherty flint in exceptionally large nodules, and in prehistoric times a large industry was carried on in the neighbourhood of Pressigny, the flint being widely distributed either in a raw or half-finished condition. More than half the French departments contain specimens found in the soil, and a certain quantity was sent beyond the frontier into Belgium and Switzerland. The chief finished product was the long blade, for use as a knife or dagger (not as a spear-head), and this had the edges trimmed on the core before being struck off. Saws and long planes were also produced, and there seems to have been a regular division of labour, implements at a certain stage of manufacture being found together. Polished implements are comparatively rare at Pressigny, but the industry lasted through the neolithic period, the finished implements not being left *in situ* as were the cores and inferior flakes. Its earlier limit is uncertain, but many Drift implements made of this flint have been recognized, and there is no doubt that the vein was first exploited before the palaeolithic Cave-period. It is of interest to compare these cores (the longest exhibited being $13\frac{1}{2}$ in.) with the tortoise-cores of Le Moustier date (fig. 21), with the technique being essentially the same in two distinct periods.

Fig. 165. Flint core, Grand-Pressigny. ($\frac{1}{6}$)

The famous find of Le Campigny was made in pit-dwellings on a hill near Blangy-sur-Bresle, Seine-inférieure, and consisted largely of flint implements and flakes, with a few bones of the ox, horse, and deer. The surface soil of a typical pit contained polished flint, and below was a filling of yellow sandy loam about four feet deep, with a typical industry. At the bottom was a deposit of cinders and charcoal with similar relics, and the pit was bowl-shaped, about fifteen feet across the mouth. One of the main flint forms is a pick six inches long, much like a number of specimens from the Thames (Case T); another is the *tranchet*, or Shell-mound type of axe-head (p. 156); other items are the scraper, plane and graving-tool, 'parrot-beak' blades, points and cores, some having palaeolithic parallels. There were also fragments of pottery decorated with linear patterns which have a much later appearance than the rest. Dr. Capitan has thus summarized the conclusions to be drawn from this discovery:

'The number of hearths showed that the plateau was selected

by a number of people who appreciated social life. The practice of polishing stone implements was here later than the occupation and filling-in of the pit-dwellings, when pottery had already been introduced. Several palaeolithic types survived, and Campigny followed on what may be called a Mesolithic period, the transition from the old to the new Stone Age. Grinding-stones imply the preparation of grain, and possibly agriculture, and the fauna and flora resembled the present. The same culture has been recognized in many parts of France, in England, Belgium, Denmark, S. Sweden, Poland, Russia, and Palestine.'

BELGIUM

The Belgian eoliths (Case 99) are quite distinct from the British series and seem to be connected with the river-terrace, not with

Fig. 166.—Two flints of Strépy type, Estinnes, Belgium. ($\frac{1}{3}$)

the plateau. They have been classified by Dr. A. Rutot, the donor, not according to their style of manufacture, which is practically the same throughout, but according to the fluviatile deposits in which the groups are found, in more than one river-valley in Belgium. The periods are named as usual after typical sites, the earliest industry (Reutel) being found in the gravel at the base of the middle terrace (80-100 ft), which yielded the raw material in abundance. After the river had cut down to the lower terrace and deposited gravel on it, the Maffle population continued the same industry on the lower level during the first Quaternary interglacial period. The next industry, named after Mesvin (Case 99), is met with on the surface of alluvial deposits on the middle and lower terraces, which had both been inundated and covered with drift after being occupied by eolithic inhabitants. All these industries are devoid of implements deliberately chipped, and consist of fragments and flakes of flint adapted to the main purposes of hammering, cutting, scraping, planing, and perforating. Some improvement is noticeable in the Strépy stage, which is the transition from eolithic to palaeolithic work, and puts an end to

the long period of human stagnation. Its horizon is near the bottom of the sandy beds in the lower series, e. g. under the *sables aigres* at St. Acheul (p. 121), and here, for the first time, are found examples of deliberate flaking (*taille*), a more or less successful attempt to make a certain pattern of tool out of a flint nodule. Much of the crust was allowed to remain on the finished implement (fig. 166) without impairing its efficiency; and according to Dr. Rutot, whose views are here summarized, it was then that weapons (as opposed to tools) first made their appearance. A primitive dagger of the Strépy period is here illustrated (fig. 167), consisting of a cylindrical nodule roughly flaked to a point at one end.

Fig. 167.—Pointed nodule, Strépy, Belgium. ($\frac{1}{3}$)

The geological deposits corresponding to the Drift in Belgium go by the name of Moséen and Campinien (to be distinguished from Le Campigny); and the following equation of the Upper Palaeolithic is approximately correct:

Period	*Belgium*	*N. France*
La Madeleine	Terre-à-briques	Terre-à-briques
Solutré	Flandrien (ergeron)	Ergeron, top
Aurignac	Brabantien	„ middle
Le Moustier	Hesbayen	„ base

The Mammoth and Reindeer periods are generally recognized, but have not the same signification in different parts of Europe. Thus in the Paris basin and the Somme valley (as at St. Acheul), the *Elephas antiquus* marks the Chelles period, and the mammoth ranges from St. Acheul I to early La Madeleine when it disappears, the reindeer then coming to the front, though first appearing at a much earlier date. In Belgium the mammoth covers practically all palaeolithic time, and only disappears towards the end of La Madeleine; whereas in S. France and at Krapina (Croatia) the *Elephas antiquus* lasted well into the Aurignac period. The species usually associated with the elephants have been already mentioned (p. 10).

Evidence of occupation in Chelles and St. Acheul times has been found especially in Hainault (Helin, Spiennes, Mesvin, and St. Symphorien); and at Sainte-Walburge near Liège the plateau brick-earth (660 ft. O.D. and 460 ft. above the Meuse) has Le Moustier levels 15 ft. and 28 ft. from the surface, this *limon Hesbayen* being now seen to correspond to the base of the *ergeron* in France. The caves represented here are: Goyet (Pont-à-Lesse), third cavern, first (top) level (early La Madeleine), with various

gravers and 'battered backs'; second level (Upper Aurignac) with pottery fragments and 'battered backs' of Gravette type, ruddle (rouge) and gnawed bones; third level (Middle Aurignac); Trou Magrite (Namur), of late Aurignac date; Trou de Chaleux and Trou du Sureau (Reindeer period); and Hastedon-lez-Namur. Specimens from Le Flénu near Mons, of poor iron-stained material, were discovered by M. Neyrinck in 1868 and are taken to represent a period after Tardenois. The industry has an eolithic appearance and is devoid of well-made implements, being mostly flakes, more or less trimmed. M. Rutot attributes it to an incursion of barbarians into France and Belgium, the Tardenois population being expelled or annihilated. The culture of Omal (near Brussels) which spread over the Hesbaye plains is now placed by some authorities early in the Neolithic, as it includes blades recalling La Madeleine and no polished flint axes. Though Belgium lies between France and Denmark, it contains few traces of Le Campigny (p. 150) like the cores, flakes, and scrapers from Élouges, near Mons, in Case 130; but the following stage of culture, named after Robenhausen in Switzerland (p. 169), is abundantly represented, as at Spiennes near Mons, which, however, is probably earlier than the full development of the polished celt. By this time the inhabitants had acquired a knowledge of agriculture, and were organized for industry and self-defence. Many iron-stained flints from the Spiennes area are exhibited, either celts or 'rough-outs', some with polished or ground surfaces; and there are two deer-antler picks (like fig. 69) which were used in the mines sunk in the chalk to extract the best vein of flint. The raw material was not only mined, but manufactured on the spot, and widely distributed in Belgium from this centre, which had been important even in palaeolithic times. The Spiennes flint is naturally greyish-brown, but exposure has induced a white patination that plainly shows iron-stains, due in this case to contact with agricultural implements on the surface. Probably older than the galleries of Spiennes are the open-cast workings at Obourg in Hainault (where a miner's skeleton was found), but there the excavating was done exclusively with deer-antler picks, not with flint tools in addition as at Spiennes. Mines for the extraction of flint from the chalk have also been discovered in France, at Champignolles (Oise), the larger dimensions of the pits in Britain indicating less skilful and possibly earlier working. The Belgian flint picks too are different, being of spindle-form, not like the so-called Thames pick, which, moreover, was not used in our mines. M. Rutot has described a vast 'floor' of Le Moustier date at Spiennes which implies an abundant supply of raw material; but authorities are unanimous as to the neolithic date of the mines so far examined, in spite of the mixture of palaeolithic and neolithic forms on the surface.

Polished celts more characteristic of the Robenhausen culture are shown from St. Symphorien near Mons; and specimens from St. Gertrude, an extensive factory-site in Dutch Limburg on the Belgian frontier (12½ miles north-east of Liège), have been presented by Miss Layard. The material is flint, with a bluish patina; and the cores and pick-like implements found in association with polished celts are referred to the opening of Robenhausen, though MM. Hamal-Nandrin and Servais recognize earlier types from the neighbourhood (such as the *tranchet*), and even palaeoliths on the plateau, above the main deposit in the ravine. This most prolific site was discovered by M. Marcel de Puydt in 1881.

Fig. 168.—Perforated axe-hammer, Doeverden, Holland. (¼)

HOLLAND

Worthy of note are two palaeoliths in Case 130 from Holland: one has a basil point (perhaps reworked) and resembles the 'developed Chelles' type, such as were found in the low terrace deposits of the Somme; and the other is a small ochreous ovate, slightly twisted. Both are said to have been found in uprooting a tree at Battum, near Deventer, in 1860, but the provenance is rather uncertain. There is also a greenstone celt with pointed butt from Holland, with others of polished flint—a thick specimen with pointed oval section from Bathmen, Overijssel; another thin-butted with squared sides from Rolde, Drenthe, and two short specimens with broad and thick butts, as well as arrow-heads of various types from Guelderland. Later, and probably dating from the Bronze Age, is a stone axe-hammer (fig. 168) found in 1721 at Doeverden, Drenthe: the type occurs both in Denmark and Switzerland. Casts of other specimens from Holland are accommodated in the lower part of Case 142; and a series of pottery fragments from the passage-graves (*Hunnebedden*) of Drenthe province are in Case 2, with photographs of complete vessels.

SCANDINAVIA

It was formerly held that Scandinavia was first inhabited in neolithic times and that the earliest traces of man were the Shell-mounds (Kitchen-middens) of the coasts; but earlier stages are now recognized and have been named Epipalaeolithic, as they

have much in common with the culture of La Madeleine, but are clearly later, and significantly follow a cold period.

Recent investigations of the climatic and geographical changes of the Baltic have thrown some light on the succession and character of the prehistoric periods; and the main divisions after the retreat of the ice-sheet about 10,000 B.C. (de Geer) have taken the names of characteristic fossil shells:

(i) *Yoldia* period: arctic climate with Dryas (mountain avens) flora. Land depressed or sea-level high. Possibly picks or axes of reindeer-antler.

(ii) *Ancylus* period: (a) sub-arctic, with Scots pine forests, wych-elm, and hazel. (b) boreal, dry, and warm, immigration of the oak. Rise of the land turns the Baltic into a freshwater lake: the Maglemose (Mullerup, Zealand) culture is referred to this period.

(iii) *Littorina* or *Tapes* period: (a) Atlantic climate, warm and moist; the oak dominant. Deep depression of the land, and Shell-

Fig. 169.—Harpoon-head with flint barbs, Denmark. (⅔)

mounds on the sea-shore. Followed by (b) drier climate: the Megalithic period with polished implements.

Many finds can be dated by their relation to the changing shoreline, and a tilting movement has been proved (p. 8), which shows that the sea was not alone responsible. Certain axes of reindeer-antler seem to have preceded the Maglemose culture, which is marked by the use of harpoons with a single row of teeth (as fig. 161) resembling some from Holderness in Yorkshire. At this stage the inhabitants of Denmark lived over freshwater lakes or marshes on rafts: they made little use of the local flint, preferring bone or elk-antler for chisels and fish-hooks, and pottery was still unknown. A little later appear harpoon-heads of bone (fig. 169) grooved along both sides for the insertion of flint splinters to serve as barbs: these flints are not carefully shaped into definite types like the Tardenois pygmies, and such a use for the latter must be negatived. The succeeding Shell-mound culture is distinguished by a variety of stone implements, the presence of the domesticated dog, and by the rudiments of pottery: it is thought to correspond to Le Campigny of the Franco-Belgian area (p. 150), and the most characteristic site is Ertebölle, between Thisted and Aalborg in Jutland.

A small Danish series is shown from these great heaps of shells, principally those of the oyster, cockle, mussel, periwinkle, and whelk, accumulated on the sites of early settlements. Like the modern inhabitants of Tierra del Fuego, the people lived chiefly

upon shell-fish, and the refuse of their meals in course of time formed large mounds, sometimes hundreds of yards in length, in which numerous flint implements, bones, and fragments of pottery are found embedded. The implements are of a rude description, and unground, but the size of some of the flakes argues a considerable skill on the part of those who produced them. One typical form (fig. 170) is peculiar in having its cutting-edge (at the broader end) produced by the removal of a single transverse flake, not by a number of blows in the direction of its longer axis. This Shell-

Fig. 170.—Shell-mound axe of flint, Denmark. ($\frac{1}{3}$)

mound axe is also known by the French name *tranchet*. The other type is a bar of flint known as a *pic*, the ancestor of the celt in Scandinavia.

Fig. 171.—Celt of Nöstvet type, Oslo Fjord, Norway. ($\frac{1}{2}$)

The bones of mammals found in the shell-heaps are chiefly those of the stag, roe-deer, and wild boar; the sheep, horse, and reindeer being unrepresented. The long bones have been broken to extract the marrow, so that it is evident that these shore-dwellers lived in part on the products of the chase. They appear to have had no knowledge of agriculture, and their only domestic animal was the dog.

In the upper part of Case 131 are specimens of flint flakes and implements from Eriksholm and the great shell-mounds at Meilgaard in north-east Jutland, with a few implements or hafts of deer-antler; also a good series of axes and transverse arrow-heads (*grands et petits tranchets*) and a pick $4\frac{3}{4}$ in. long from a shell-mound near Vedbœk, Zealand, excavated by the donor, Hr. Avnholt. Longer picks are exhibited (to 8·7 in.) and a good series of end-scrapers from Aarhuus, Jutland, given by the late Lord Avebury (Sir John Lubbock). Below is a section from the

Meilgaard mound, which was examined and correctly interpreted by Worsaae in 1850. Among the shells can be seen a few bones and flint implements.

Contemporary with the shell-mounds was the Nöstvet type of axe or celt, probably derived from the *pic* but made of greenstone and volcanic rocks with a conchoidal fracture, in districts naturally devoid of flint. The type-station is at the inner end of Kristiania (now Oslo) fjord, but the Nöstvet culture is revealed by dwelling-sites also on the coast of Bohuslän, Sweden, and in southern Norway. At first the greenstone was merely chipped, a later stage being marked by polishing the two faces near the cutting-edge. This type (fig. 171) is distinguished from the common neolithic celt by having its cutting-edge flush with one face, not in the

FIG. 172.—Evolution of Scandinavian celts, with sections. (¼)

central plane, a peculiarity due originally to the schistose nature of the material used. The cross-section varies, the earliest being triangular and a trapezoidal form emerging. The length ranges from 2½–6 in., and two series, given respectively by Dr. Shetelig (island of Bömmel) and Dr. A. W. Brøgger (Oslo fjord), are exhibited in Case 132.

The neolithic industry of Scandinavia, when it had passed this primitive stage, assumed a marked individuality and developed a great variety of forms. The later products of Denmark are among the finest examples of flint-chipping in existence, and are only surpassed by the marvellous knives of pre-dynastic Egypt (Cases 105, 151). A great change took place in the conditions of life, and after the first of the following four divisions begins the Megalithic period, with various types of massive stone monuments.

1. Flint celts with pointed oval section, some polished (fig. 172, no. 1). Form of graves unknown, perhaps simply holes in the earth.

2. Flint axes with squared sides, convex faces and thin butt, some polished (no. 2). Dolmens of oldest type, without passage of approach.

3. Flint axes with squared sides and thick butt, almost square section (no. 3): flaked daggers (fig. 177) and arrow-heads. Passage-graves (cf. figs. 89-91), all but the cap-stone covered with a mound of earth. Amber frequently found.

4. Flint celts as before but more fan-shaped (with expanded cutting-edge); ribbed, polished, and perforated axe-hammers (fig. 173), polished gouges (fig. 174), and developed daggers (plate X. no. 2). Stone cists, at first with cap-stones not covered with earth; later, entirely covered, and sometimes below original surface. Amber rarely found. Also (in Jutland) graves below surface with-

Fig. 173.—Pierced axe-hammer, Denmark. ($\frac{1}{4}$)

out stone cists, but outlined with boulders, for single burials: men buried with perforated axe-hammers or flint celts, women with amber necklaces of beads and plates. It now seems probable that periods 3 and 4 are aeneolithic, and that copper (if not bronze) was known: the perforated axe-hammers would thus correspond to those of our Bronze Age, and some are evidently copied from metal patterns. They are all elaborate productions in several kinds of stone (fig. 173), and among the latest is the boat-shaped variety (no. 3), also found in France (p. 147).

At the top of Case 133 are shown illustrations of implements and megalithic tombs in the sequence proposed by the late Prof. Montelius, who held that in the fourth stage of culture amber, which had long been exported to the south of Europe, began to be valued by the natives, who refrained from burying it. The peculiar single-graves of Jutland may be accounted for by a scarcity of stone slabs in that region, but they contain the bodies of invaders from the south, sometimes accompanied by such

pottery vessels as fig. 175 (Case 36), which may have been derived from the hollowed section of a tree.

In the Scandinavian area, and generally in Europe (p. 148), the dead were placed in all these tombs unburnt, in varying numbers and attitudes; and in some cases the flesh was apparently allowed to decay before the bones were interred. Signs of fire have been noticed in the stone chambers and sometimes on the bones, but this must be explained by periodical opening of the tomb and disturbance of the remains, not by the practice of cremation. No agreement has been reached as to the absolute chronology of the neolithic period in Scandinavia, but bronze seems to have been introduced later than in Britain, and a date midway between the two extremes suggested would be 1500 B.C. for the opening of

FIG. 174.—Flint gouge, Denmark. (⅓)

FIG. 175.—Neolithic vase, Denmark. (⅕)

the Bronze Age in the southern area, the northern part of the peninsula remaining in the Arctic Stone Age which is represented by slate lance- and arrow-heads, celts often with bevelled cutting-edge, and pottery with herring-bone and linear patterns, also pitting, which sometimes occurs on British neolithic ware. The Arctic people were hunters and fishermen, while in southern Scandinavia agriculture and domestic animals betokened a higher civilization. Round the coasts of the peninsula, in Finland and in the Baltic provinces of Russia, are traces of one and the same culture, but in Götaland and south Norway the two are blended. The cordoned vases, which were evidently introduced from the south and correspond to our beakers, are wanting in the Scandinavian area with the exception of the Danish peninsula.

Specimens from Norway and Sweden are exhibited in Cases 132, 133, and attention may be called to an unfinished axe-hammer, which shows a cone in the middle of the perforation, caused by the use of a metal or bone cylinder for perforating with wet sand. The perfection of this method is seen in a Swedish specimen (fig. 173, no. 1) which has a raised border round one

mouth, and a cylindrical boring with an inner groove. The workmanship could hardly be bettered. An example of the Fredsgård type which is also represented in Britain (Cases 90–93), had originally a polished black surface but is now covered with white patches due to decay (Case 133). The faces of this type are parallel, the section rectangular, and the butt rounded. An earlier type of perforation is seen in the pebble mace-heads (Case 132) bored from both faces by primitive methods (hour-glass pattern); and the adjoining cupped pebbles (like fig. 134) seem in this case to show the preliminary pecking of the two flat surfaces.

The richest areas for implements of all kinds are south Sweden and the Danish islands with Jutland; and most of the types are well represented in Cases 134–8. Celts are mostly of the thin and thick-butted varieties, and some of the Dolmen type (p. 158) run to extraordinary lengths (maximum, 15 in.). The highest form of flint working is, however, the dagger, which now gives its name to a period embracing the latter part of the Passage-grave period and that of the Cists. The simple leaf-shaped blades are the earliest finished type, but in Case 134 is a series of primitive (or possibly unfinished) daggers all distinctly brown in colour. If the leaf-pattern is related (as seems probable) to the flint-daggers of the early Bronze Age in Britain (Case 89), all later developments must have taken place after the introduction of metal, and the same conclusion is drawn from the perforated axe-hammers, some of which have parallels in this country; but even if copper was known in Scandinavia, bronze was introduced perhaps much later, and all the daggers may therefore belong to the local Neolithic.

Fig. 176.—Flint arrow-head, Denmark. ($\frac{1}{2}$)

The leaf-pattern is eventually provided with a handle by lengthening and thickening one end, which assumes a triangular section (common in Denmark but rare in south Sweden) or a square or else a lozenge section (more common in south Sweden than in Denmark); and the 'seam' down the middle of the handle in some specimens (pl. X. no. 2) has been interpreted as an imitation of the stitches in a leather covering of the grip. These highly developed weapons are found very rarely in Britain and then much reduced by rechipping; but occur freely both in the cists and the isolated (single) graves of Jutland and Zealand. It is remarkable that when ripple-flaking showed flint-working at its best, the practice of polishing flint was in abeyance, the thick-butted celts being much less frequently finished in this manner than the thin-butted variety of the dolmens. Much the same seems to be the case in Egypt (p. 188), and it is curious that other

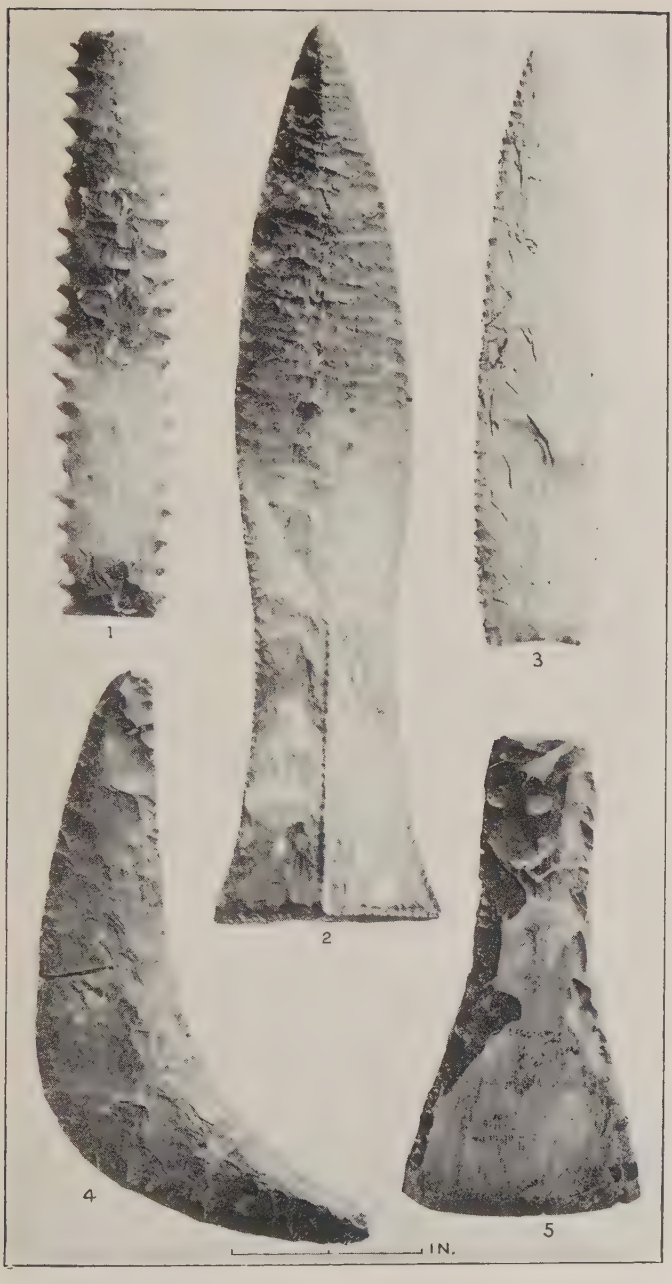


PLATE X.—NEOLITHIC FLINT IMPLEMENTS, DENMARK.

(Case 136, *see* pp. 160, 161)

Danish forms suggest a connexion with the Nile—the tanged arrow-head of flint with triangular section (fig. 176) characteristic of the passage-graves; the serrated blades (pl. X, nos. 1, 3) and

Fig. 178.—Amber stud and model axe-head, Denmark. ($\frac{2}{3}$)

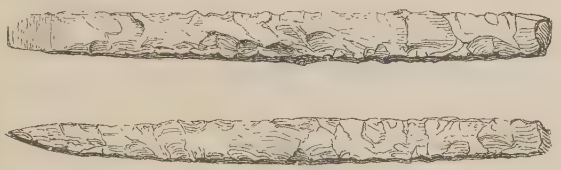


Fig. 179.—Flint chisel, Denmark. ($\frac{1}{3}$)

Fig. 177.—Flint dagger, Denmark. ($\frac{1}{3}$)

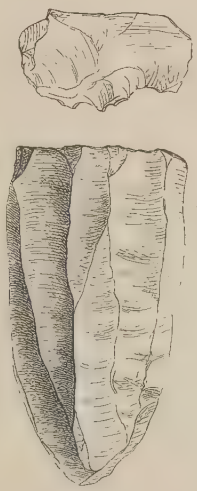


Fig. 180.—Flint core, Denmark. ($\frac{1}{3}$)

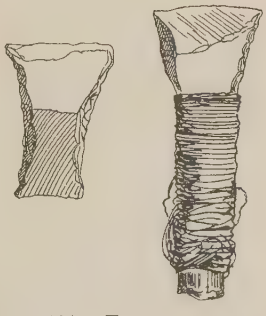


Fig. 181.—Tranverse arrow-head with original binding. ($\frac{1}{1}$)

crescent 'sickles' (pl. X, no. 4) in addition to the flint-daggers (fig. 177) being cases in point.

In Case 137 (top) the contents of a long chambered barrow

(passage-grave) at Veiby near Frederiksborg, North Zealand, comprise thick-butted celts with nearly parallel sides (the earlier form) or with expanded cutting-edge (characteristic of the Cists), and may indicate repeated openings of this ossuary: there are also polished gouges (as fig. 174); amber beads, some in the form of axe-heads (as fig. 178), and a typical arrow-head (as fig. 176).

Other notable items are the flint chisels of square section (fig. 179) sometimes partly polished, and cores (fig. 180) from which flakes were struck, often of 'pygmy' size. Transverse arrow-heads (*petits tranchets*) date at least from Shell-mound times, though they seem to have had a long life in Europe. One in its original binding is shown in Case 137 (fig. 181). Several grooved hammer-heads of the same type as fig. 185 but smaller than usual are in the same Case, with slabs of sandstone used for grinding flint axes, and a large example of unknown origin is placed at the foot of the spiral staircase leading from this gallery.

SPAIN AND PORTUGAL

Though there is no trace of anything eolithic in Spain the Chelles period is well represented and is now thought to have spread into the Peninsula from North Africa and thence to France, Italy, and England.

A site that has yielded much palaeolithic material but was never properly examined is San Isidro, south-west of Madrid, where sand and gravel were dug for many years on a small plateau about 140 ft. above the Manzanares river. The Chelles type probably came from gravel 40–50 ft. from the surface, and the clay and sand above produced fine and unrolled examples of St. Acheul I—a thin, flattened oval type with straight (not curved) sides—the St. Acheul II group having more tapering points and triangular outlines. A few hand-axes, roughly chipped out of cherty flint are exhibited in Case 139, with a single flake, all sharp and unrolled except fig. 182. The same valley has recently yielded specimens from Chelles to Aurignac in no less than nineteen horizons which have been examined and published by Prof. Obermaier and Señor Perez de Barradas. The series includes the Levallois and Abri Audi types, and there are occasional sterile zones which assist the classification.

Le Moustier is well represented in Spain by a pre-Capsian industry that foreshadows the later Palaeolithic of the caves. Many of the European Aurignac forms are found in the local Capsian which developed on peculiar lines during Solutré and La Madeleine times and passed into the diminitive geometric flint types which spread with the Tardenois culture to France and the north of Europe, via the east end of the Pyrenees. All through

the Drift period and till mid-Aurignac times the Peninsula enjoyed a temperate climate, with *Elephas antiquus*, Merck's rhinoceros, and red deer among the fauna; but after that date the first two species are wanting, and the climate of the northern area turned cold, reindeer, woolly rhinoceros, and mammoth appearing in this latitude, and remaining till the last phase of La Madeleine.

Cave-art in Spain developed in two directions. In the north-west (Cantabria) it resembles and rivals that of southern France, the most famous site being the Altamira cave near Santander. Quite different is the south-eastern school, which produced diminutive pictures of animals, but more especially human figures, quite elementary in style but sometimes revealing a faculty of group-

Fig. 182.—Chert hand-axe, San Isidro, Madrid. ($\frac{1}{3}$)

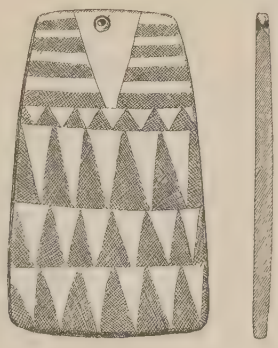


Fig. 183.—Engraved slate amulet, Portugal. ($\frac{1}{4}$)

ing in scenes of war and the chase. Painting is generally in red, and where caves were wanting, rock-shelters were decorated in this fashion. The Peninsula was exceptional in preserving a kind of art after the palaeolithic period, but this soon degenerates into conventional forms and finally into the geometric patterns of the Neolithic, as seen on the schist plaques of Portugal representing a female divinity by means of hatched triangles and zigzags. The specimen illustrated (fig. 183) was found with another 12 ft. deep in a hill between Vendas Novas and Beja, Portugal.

Such amulets have been published by M. Cartailhac and others, and more recently by M. Louis Siret, one of two brothers to whom the discovery and publication of the Spanish series in Case J are due. M. Siret holds that the triangle is symbolic of the female divinity or principle already recognized in the neolithic period not only in Spain but in other parts of the Mediterranean, as at Hissarlik (site of Troy) and in Crete, where the double-axe (conjoined triangles) is well known. In his opinion these coincidences

point to a commercial or racial connexion at that early date, and the triangle and allied symbols were gradually and unconsciously developed into quasi-human figures, such as the statuette from Adalia in Case K. In certain advanced areas human attributes were subsequently added to the primitive religious conceptions of early Europe; and Greek anthropomorphism may therefore be traced from such rude designs as those here shown, which offer some points of resemblance to the chalk 'idols' found in Yorkshire (Case 26) and specimens of marble and terra-cotta from the Mediterranean countries (*Bronze Age Guide*, pp. 151, 164). Another of these engraved plaques is exhibited in Case J with four pieces of pottery from dolmens near Arraiólos, province of Alemtejo.

Fig. 184.—Stone celt, Alhama, Granada. ($\frac{1}{3}$)

A series of palaeolithic and indeterminate types in flint collected by Senhor José da Fonseca from the surface eight miles N.E. of Lisbon is in the upper part of Case 139; and to the right should be noticed a few flints from the famous shell-mounds of Mugem in the Tagus valley. Casts show the peculiar triangular flint-daggers and exceptionally large celts with pointed butt and oval section found in Portugal; and smaller celts of the same type from Alhama da Granada (fig. 184) fill the lower part of Cases 139, 140, all referable to the late neolithic period, like the series in Case 138 from the Woman's Cave (*la cueva de la muger*) at Alhama, consisting of pottery fragments, shell-armlets, and implements of bone and flint. In the same corner Case is a mixed collection of neolithic and later dates (two objects, a fish-hook and spear-head, being made of bronze) from the caves of Gibraltar. Fragments of reddish pottery fragments include several spouts, and some are impressed with geometric designs; there are also ground stone celts, bone awls and pins, fragments of shell-armlets and flint flakes, besides animal bones. More particularly there is

a greenstone celt from the Genista Cave, and a sandstone specimen of the same type from a fissure near Windmill Hill Cave, discovered in 1864.

The Gibraltar skull of a woman, now in the museum of the Royal College of Surgeons, has been briefly noticed above (p. 18), and ranks as the first recorded discovery of the Neanderthal race, having been found in Forbes Quarry, North Front, in 1848. Portugal is held, by more than one authority, to have been the centre from which the dolmen-idea spread over western and northern Europe; and it is therefore not surprising that the megalithic tombs of the Peninsula are culturally in advance of the Scandinavian: thus the aeneolithic or transition period is said to have ended in the Peninsula 2500 B. C., about which time our own chambered long-barrows began to be erected.

ITALY AND GREECE

The mammoth has been found as far south as Rome but its companion the woolly rhinoceros was never in Italy, which was spared the rigours of the glacial period. In its Pleistocene deposits have been found good examples of the Chelles and St. Acheul industries, often associated with the hippopotamus and straight-tusked elephant (*antiquus*). Caves in the south have yielded a typical Aurignac culture, and in the north Grimaldi, near Mentone, was evidently a centre of distribution in the later stages of that period; but Solutré types are unknown from this or any other Mediterranean country. A few wall-engravings have been found in an Italian cave (Romanelli, Terra d'Otranto); and in Sicily and the south occurs a microlithic (pygmy) industry developed from the Capsian of Africa. In common with N. and central France, Belgium, Scandinavia, and N. Germany, Italy had also the industry of Le Campigny, a new departure leading to the finest neolithic series.

Representing the Drift period are three hand-axes (Case 139) found near Caramanico, Chieti (a well-known St. Acheul site); and one from Cerveteri on the coast, half-way between Rome and Civitavecchia. On a board are several rolled flakes from the neighbourhood of the capital; but most of the exhibits are neolithic, and the perforated axe-hammers are probably later. The celts are mostly of the pointed-butt type with oval section, and several are made of a fine hard material like jade, but are not all of the same form. Arrow-heads from the Isle of Elba are of rough workmanship, but most of the Italian specimens are not only well made with tapering blade and tang, but are of attractive colours, mostly yellow. A small series from Perugia is of this

description, including a few small implements. Sicily is also represented, and a grooved mallet from Catania has been selected for illustration (fig. 185) as a good example of a mining tool found in many parts of the world (p. 114).

Celts from Greece are of hard stone (not flint), small and well polished, much like those of Asia Minor: and both on the mainland and the islands are found cores and flakes of obsidian (volcanic glass), a brittle material derived in that part of Europe from the island of Melos. It has the same conchoidal fracture as flint and gives a very sharp edge to flakes, which have been used as

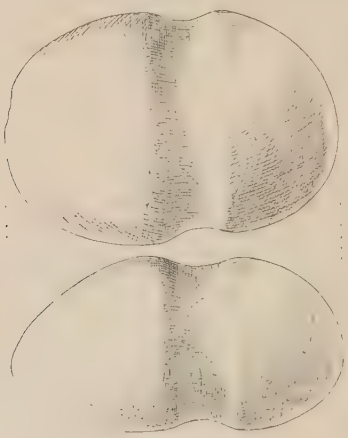


Fig. 185.—Grooved mallet, Catania, Sicily. (⅓)

Fig. 186.—'Shoe-last' implement, near Worms, Germany. (⅓)

razors in Mexico, but the edge is not so durable as flint. Examples are shown in Cases 139, 140, also from the island of Crete, where the neolithic period is represented by several small celts and two almost globular mace-heads of stone with straight and hour-glass perforations. A small series of chert from Imbros close to the Dardanelles should be noticed in Case 139.

GERMANY

Though earlier traces are rare and not generally recognized, the industry of St. Acheul is clearly represented in Germany, and the principal sites are Markkleeberg near Leipzig and Hundisburg in Saxony; the Mauer jaw, however, found nearly 80 ft. from the surface in a stratified deposit near Heidelberg, is sufficient proof of an earlier occupation in the south. The extensive glaciation of

north Germany may account for the absence of earlier Drift forms, but the climate was evidently a mild one when the terrace-deposits were laid down near Weimar with flint implements suggesting an early phase of Le Moustier. The possible position of Taubach in the chronological scheme is indicated on p. xiv ; and later palaeolithic remains are often found in the loess (mainly an aeolian or dust deposit) of the Rhine and Danube (as at Krems 40 miles above Vienna), and in caves (as Sirgenstein, in the Achtal near Ulm) ; but are poorly represented in Case 141 by series from Höhlefels near Blaubeuren in Achtal, and the Räuberhöhle (Robbers' cave) near Etterzhausen in Bavaria (La Quina and Aurignac types). Specimens of arctic varieties of the *Hypnum* moss show the cold conditions prevailing when the Schussenried station in Würtemberg was occupied ; and the groups of skulls found buried at Ofnet show that the round-headed (brachycephalic) intruders from the East had reached Bavaria in the final stage of the Palaeolithic. This cave near Nordlingen was explored by Dr. R. R. Schmidt in 1907–8, and showed that the population was already mixed, the cephalic index ranging from 70 to 89 (p. 97).

The flints from Thaingen in this Case are noticed below under Switzerland (p. 168), and other countries of central Europe are sparsely represented. Many of the neolithic celts on German soil are clearly of Scandinavian origin, and a thick-butted example is shown from a site so far south as Herford, Westphalia. A series from the Baltic island of Rügen includes daggers (much reduced by sharpening), arrow-heads like fig. 176, and thick-butted celts like fig. 172, no. 3 ; and there are different specimens from the surface at Arcona in that island, where such roughly flaked and iron-stained flints are abundant, but at present only vaguely dated. Arranged on boards are polished (or ground) celts of various rocks (not flint) from Saxony, Halberstadt, and Magdeburg, most of them of broad stumpy form with oblong cross-section. This is a late and degenerate form of the celt, the earlier stages of which are indicated in fig. 172; and the German group is dated by its association with cord-pattern pottery (*Schnurkeramik*), which is characteristic of the later Passage-grave and Cist phases of the Neolithic. An example is illustrated (fig. 186) of the peculiar stone adze common in Germany and supposed to resemble a shoe-last (*Schuhleistenbeil*) : the type has a flat under-face, arched back, and rounded edge probably for use as a hoe. Another kind of celt, with wider distribution, was made of semi-precious materials such as jadeite (p. 100) ; and casts of an important 'hoard' found at Gonsenheim near Mainz (Mayence) are exhibited. They closely resemble fig. 94, thin and beautifully polished with pointed butt and expanded cutting-edge ; the materials were greenstone and chloritic albite, and the five had evidently been arranged symmetrically in a leather case before being buried. A similar set of five was

found in leather at Büssleben, Erfurt; and the source of such materials as jadeite, callaïs, and nephrite used by neolithic man has been much discussed. The opinion that all of them could be procured in Europe is confirmed by the discovery in 1899 at Jordansmühl, Silesia, of a block of nephrite weighing two tons.

There are several instances in this Case of the incomplete boring of stone axe-hammers, and fig. 187 shows the method

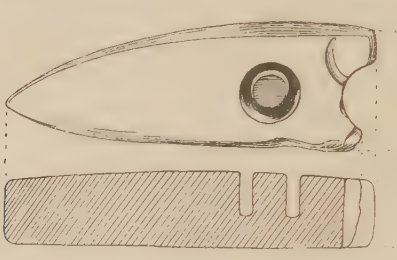


Fig. 187.—Axe with incomplete perforation, Bohemia. ($\frac{1}{2}$)

adopted, which differs from the stick-and-sand device of earlier date (p. 107) and implies the use of a cylinder either of bone or metal, made to revolve probably with a bow-drill. A perforated hammer from Diera near Dresden has been bored but in a slanting direction, the perforation itself being conical.

SWITZERLAND, Etc.

The period of La Madeleine is represented in Case 141 by a few flakes from a cave near Thaingen (Kesslerloch), where the finest palaeolithic engraving was found—the grazing reindeer. There is also a perforated reindeer-tooth, no doubt worn as a pendant on a necklace, like that in fig. 139, no. 3; but the neolithic period is better represented '(below in Case F)'.

In several parts of Europe, but more especially in Switzerland, primitive men lived for greater security in villages of wattle and daub raised upon high piles driven into water or marsh near the margin of the lakes. The settlements of this kind in the Swiss lakes are very numerous, and the antiquities discovered on the various sites show that this manner of life continued from neolithic times through the whole of the Bronze period into the earlier Iron Age. Attention was first drawn to the lake-dwellings during the exceptionally dry season of 1853, when piles were exposed on the shores of the lake of Zürich, and numerous antiquities brought to light; and in succeeding years similar settlements were discovered in most of the larger lakes as well as in several of smaller extent, such as Inkwyl and Moosseedorf. The conditions obtaining in the

smaller lakes have often been the most favourable from an archaeological point of view, owing to the formation in the more tranquil and shallow waters of a deep layer of peat moss, which has acted as a preservative for the more perishable objects. In these smaller lakes the piles were often raised and strengthened by heaps of stones and stakes round their bases; in the larger, piles were used alone. In some cases, as in the island of Borneo at the present

Fig. 188.—Village built on piles, New Guinea (*after photo by J. W. Lindt*).

day, houses raised on piles may have been built on dry land, but as a rule the lake-dwellers must have lived actually over the water, just as in New Guinea men still live in pile-villages in the shallow waters of rivers and sea (fig. 188). The remains found on the sites of the pile-dwellings built and occupied in the Stone Age, of which Robenhausen is considered the typical example, show that at this period the number of domestic animals possessed by man was still small, and that food was largely furnished by the wilder species; oxen were numerous, but the sheep, horse, and domestic pig were extremely rare, not becoming general until the Bronze period. Of the wild animals then inhabiting the district, but now no longer occurring in Switzerland, the urus, bison, elk, and stag were among the commonest.

But the lake-dwellers were no longer wholly dependent upon hunting for their livelihood. They cultivated wheat, barley, and millet, from which they made a rough kind of bread; they preserved apples and pears, and were also acquainted with the raspberry and blackberry. Although skins were still largely used for clothing, flax was grown, and garments were woven from it. Not only spindle-whorls of stone and pottery, but even pieces of woven stuffs have come to light; and the numerous earthenware vessels which have been discovered show that the art of the potter had made considerable progress, although the use of the wheel was still unknown. The most important implement or weapon was the polished axe, which was commonly of small size and made of hard stone like diorite. It was often mounted in sockets of deer-

antler and fixed in wooden hafts (fig. 189), the elasticity of the horn socket rendering the haft less liable to split. Other weapons and implements were flint arrow-heads, flakes and knives, rude stone hammers, and corn-crushers; and attention may be drawn to a flint knife still retaining its wooden handle (fig. 190).

In the large standard Case F in the centre of the Prehistoric Room are exhibited remains from the lake-dwellings of Switzerland.

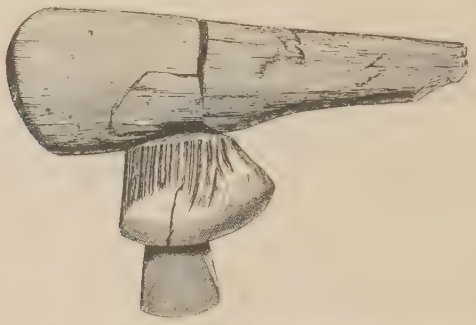


Fig. 189.—Stone celt mounted in antler and wood, Switzerland. $\frac{1}{4}$

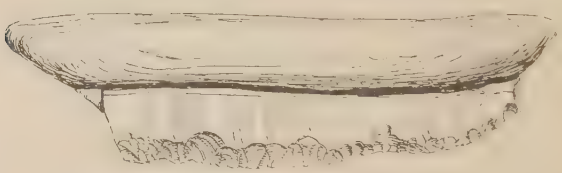


Fig. 190.—Flint knife with wooden handle, Swiss lake-dwelling. $(\frac{2}{3})$

those of the neolithic period being on the west side (nearest the main staircase), from Neuchâtel, Bienne, Constance, Moosseedorf, and Pfäffikon.

Relics that have fallen into the water from pile-dwellings are apt to be mixed, but M. Paul Vouga, whose father was one of the original excavators of such sites, has recently put forward a classification based on the stratification of Lake Neuchâtel. There is an early neolithic level, and a later period represented by three successive occupations of the same site: middle and late neolithic, and aeneolithic (transition to Bronze Age); but there is a distinct break (perhaps due to a period of high water) and a falling off in pottery between the first two stages. The early types are antler sockets for celts, with no reduction of the end which fitted into the wooden handle; translucent flint, often resembling La Madeleine blades; well-fired pottery, mostly black and lustrous.

of rounded form, or biconical with pierced lugs for suspension; perforated bones for use as beads, but no spindle-whorls.

Middle neolithic antler sockets have a pronounced tang for insertion into the handle, forming a kind of stop-ridge; the contemporary flints are opaque, arrow-heads triangular or lozenge-shaped, and the pottery is thick and badly fired, of cylindrical form, while the axe-hammers are triangular.

In the later Neolithic these types are perfected, and the sockets of antler have long tangs, sometimes split; the axe-hammers are of lozenge form, the arrow-heads barbed and tanged. Pottery is much better fired but still inferior to the earliest; and cordons, ears, and incised patterns make their appearance.

The axe-hammer illustrated (fig. 191) is typical of the transition period, with cylindrical perforation and swollen sides; and contem-

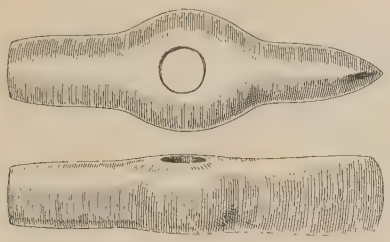


Fig. 191.—Perforated axe-hammer, Yverdon, Switzerland. ($\frac{1}{4}$)

porary are flints imported from Pressigny (p. 150), and a reddish ware with parallel incisions and festooned ribbon-pattern, but the handle is still unknown.

At the south end of the Case (towards the Central Saloon) are grouped specimens of textile fabrics woven of flax, fragments of netting and thread, with boxes containing charred wheat, barley, bread, dried apples, hazel-nuts, and raspberry seeds.

Central Europe is not well represented, but there are two perforated axe-hammers of a black stone from Buda-Pest and small celts from Hungary; a broken axe-hammer, that has been bored twice but incompletely with a cylindrical tool, comes from Zdanic, Bohemia; also a thick butted celt of Scandinavian type (but not of flint) from Cucuteni, near Jassy, Rumania. A group of small arrow-heads, all but one with hollow base, comes from Vloclavek, and pygmy implements with cores and worked flakes from Ossówka, Kielze, near Stopniza; Poland being one of the chief microlithic centres. An example of trapeze form (like fig. 214, no. 2) is shown from Plock on the Vistula.

Finland was no doubt influenced by Swedish culture, but the three squat stone celts in Case 142 from Carelia have a bevelled

cutting-edge recalling types found in Sweden and Norway outside the flint area, like Lihult, Vespestad, and Westland. Casts of perforated axe-hammers ending in animal heads and other types from Carelia are also exhibited, dating from a time when most of Europe was in the Bronze Age, and backward peoples were copying in stone the few metal types that came into their hands.

From central Russia come a small stone axe-hammer of cylindrical form and a heavy pointed axe, partly polished (Govt. Penza); also obsidian flakes and arrow-heads (Murom on the river Oka). Farther west in the province of Minsk were found the stone celt with oblong section, and perforated axe-hammer from Borissov in Case 142; and from Kiev in S. Russia come the six perforated axe-hammers (fig. 192), thick-butted flint celts like fig. 172, no. 3, a 'shoe-last' celt of Central European type like fig. 186, and sundry arrow-heads and scrapers of rather indeterminate date.

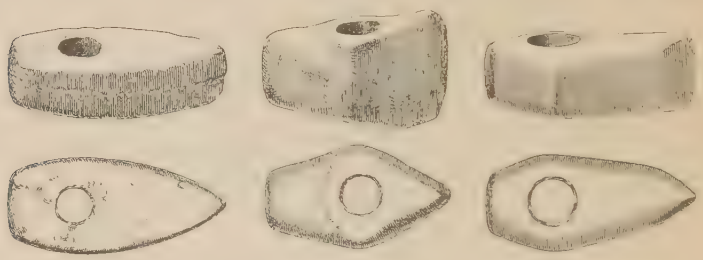


Fig. 192.—Perforated axe-hammers, Govt. Kieff, Russia. (¼)

Between Sicily and Africa the Mediterranean is comparatively shallow, and a land-bridge apparently existed in Tertiary times, but the date of its disappearance is uncertain. The presence of Neanderthal man in Malta has been proved by Sir Arthur Keith who described some teeth found in the Dalam cave (Ghar Dalam); but the most striking antiquities of the island are temples built of enormous blocks of stone, which are sometimes squared and pitted on the outer face by conical borings. The fragment here illustrated (fig. 193) was found loose many years ago, by Prebendary Browne at Mnaidra, one of the greatest neolithic structures known; and Sir Martin Conway has presented another fragment with smaller borings from Hal Tarxien, a similar temple excavated by Prof. Zammit, who found the spiral ornament used at a surprisingly early date. His gift of typical neolithic pottery is exhibited in Case 4, the technique being of the highest order and difficult to match elsewhere.

Excavations have also been made in Malta by Miss M. A. Murray who presented some pottery fragments in Case 4 from Borg en Nadur, a group of ruins on a spur which continues into

the Bay of S. Giorgio and forms the tongue of land on which are ancient cart-tracks worn deep into the rock. The more ancient ruins are below the Borg (a tower on the summit) and cover about half a square mile. An apsidal building of massive stone blocks (megalithic), of the same general form as Hal Tarxien, was laid

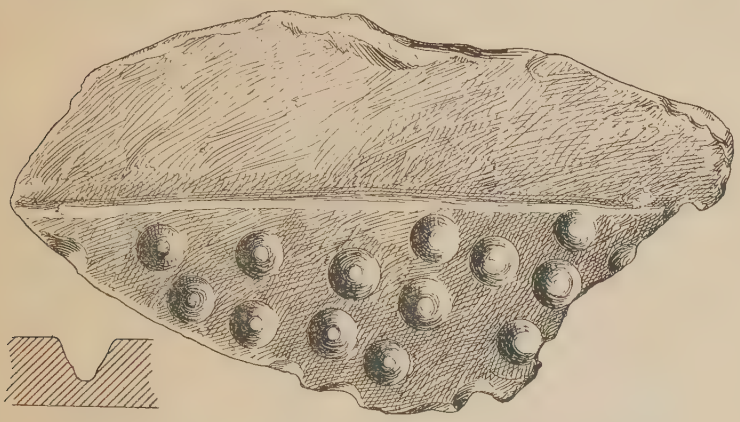


Fig. 193.—Borings on megalith at Mnaidra, Malta. ($\frac{1}{2}$)

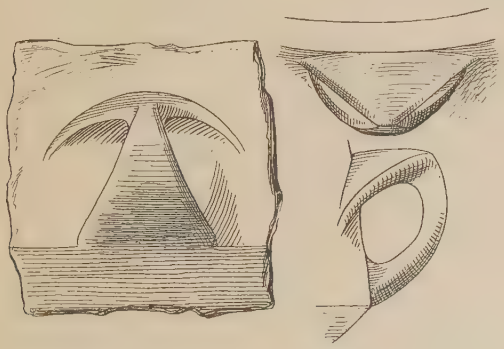


Fig. 194.—Handle of neolithic pottery, Malta. ($\frac{1}{2}$)

bare, but the irregular distribution of neolithic and Bronze Age pottery showed that the site had been much disturbed, and stratification was therefore unimportant. Miss Murray in consultation with Mr. William Burton describes the presumed neolithic ware as a fine clay with grey or black surface, hand-made (without the wheel) and covered with slip, to which was added manganese to give the darker colour: the handles are of peculiar triangular form (fig. 194) or countersunk (p. 180), and both form and colour sug-

gest that these were copies of stone vessels. The texture of the polished ware resembles soap-stone, and the white inlay on black is gypsum, applied after firing. The Bronze Age ware is of the same clay but differs in certain respects: for instance, it is not copied from stone, the handles are of ribbon form, and the potter's wheel was in use: a good example is the (restored) bowl in this Case with metal rivets imitated in clay.

HITHER ASIA

In Asia Minor as in Greece the palaeolithic period seems to be unrepresented, and in later times native hard stones were utilized, such as diorite, trachyte, basalt, haematite, and nephrite of poor

Fig. 195.—Diminutive stone celt, Ephesus. ($\frac{1}{2}$)

Fig. 196.—Stone celt, Ktima, Cyprus. ($\frac{1}{4}$)

quality, while there was also a considerable obsidian industry, the principal centre for that material (volcanic glass) in Europe being the island of Melos. The stone series has been divided by Chr. Blinkenberg into solid celts with pointed or blunt butts, thin celts, thick and thin chisels (narrower than the celts), and axe-hammers with shaft-hole. Both thick and thin celts have been found together in a hoard near Megalopolis (Arcadia), and were evidently contemporary, but one cannot be considered an advance on the other, and it is probable that the thin variety originated in the use of stones that naturally split into plates like slate. A common type is illustrated from Ephesus (fig. 195), and other series in Case 143 come from the Troad and Samos, Smyrna, Sardis, Iconium (Konia), Tralles, Magnesia, Erythraea, Hierapolis, and Antioch. A marbled mace-head about the size of a Tangerine orange comes from Hierapolis in Anatolia and has a tapering (conical) perforation. There is evidence that the use of obsidian lasted well into the Bronze Age of this area, but the celts are not found in graves or habitations of that period, and were probably given up as soon as metal was introduced, copper being worked in Cyprus as early

as 2500 B.C. In that island stone implements are quite exceptional, and special attention is drawn to a heavy celt with oval section and blunt butt (fig. 196) found at Ktima and given by the marquess of Ivrea. A pebble with hollows pecked in the middle of both flat faces (apparently the beginnings of perforation) is exhibited beside it in Case 143.

In the upper part of Cases 143, 144 are many implements of

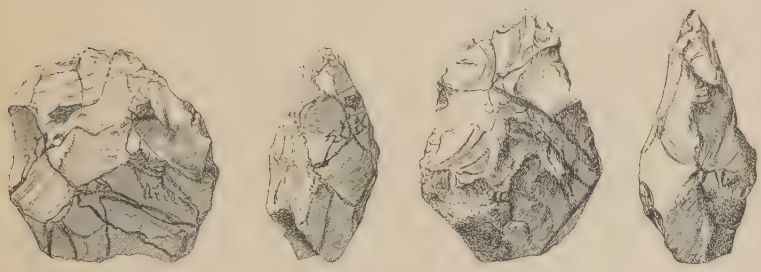


FIG. 197.—Two hand-axes of Drift type, Jerusalem. ($\frac{1}{4}$)

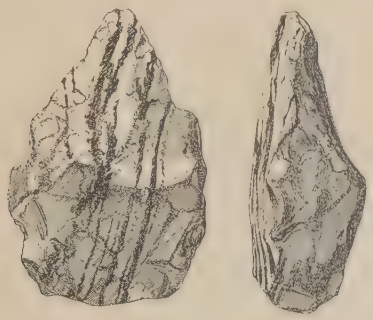


FIG. 198 —Implement of banded chert, Jerusalem. ($\frac{1}{4}$)

early palaeolithic types from the surface in the neighbourhood of Jerusalem, collected and presented by the late Mr. Herbert E. Clark: others, with tortoise-cores, are exhibited in drawers below Case S. Three specimens are illustrated in front and side aspects (figs. 197, 198) and all are of a local cherty stone, frequently with black bands. It is possible that here and on the Egyptian desert palaeolithic man was not disturbed as in Europe by climatic changes involving a glacial period, though there are signs of a corresponding pluvial period. Almond-shaped (amygdaloid) and long-ovate hand-axes, as well as 'points' of Le Moustier type, borers, and scrapers have been recognized from this area, and a local Cave-period is now established for the country. The date of the recently found Galilee

skull is well attested by associated implements of Le Moustier type; and there are many late palaeolithic features in the large series from Bethsaour, of which specimens are shown in Case 144, the gift of Capt. R. F. (afterwards Sir Richard) Burton. The site is a ledge of limestone near Bethlehem, strewn with flints; and many presumably came from cave-deposits, but different periods of occupation are probably represented in Case 144 and in drawers under Case S (from the collection of Abbé Morétain).

Better dated are the two series excavated by Mr. Turville-Petre near the sea of Galilee and presented by the British School of Archaeology in Jerusalem. That from the cave known as Mugharet el Zuttiyeh belonged to the horizon of the Galilee skull, which is clearly dated by the subtriangular hand-axes, the side-scrapers, 'points', flake-implements with facetted butts, and small tortoise-cores, all being of Le Moustier facies. The other group is from Mugharet el Emireh, and marks the transition from Le Moustier to Aurignac, there being a few survivals but also some fresh forms like the carinated plane and diminutive end-scraper; and there is an obvious connexion between these and cave-deposits farther west on the Mediterranean coast.

An interesting series of Aurignac date, excavated and presented by Prof. A. E. Day, came from a rock-shelter at Ksâr 'Akil, Antilyâs, near Beirût, Syria, which was dug to a great depth and yielded, besides a large number of chert implements, remains of two species of wild goat (one being *Capra primigenia*), a large and peculiar fallow deer (*Dama mesopotamica*), species of deer, gazelle, and roe-deer, bison, wild boar, and hyaena, this last differing from the species now existing in the country. A selection of the implements is here illustrated (fig. 199), including gravers (*b*, *c*), 'point' (*d*), round scraper (*a*), end-scrapers on blades (*e*, *f*, *g*, *l*, *m*, *q*), side-scraper (*k*), 'battered backs' of the coarse (*n*) and fine varieties (*h*, *j*), and worked flakes (*o*, *p*), the former with typical side-dressing. The colouring is in different shades of yellow merging into grey, and all the edges are fresh. Comparison with French specimens of the same period at the other end of this gallery will show how much these two distant developments of the Capsian culture have in common (p. 16).

From the same promontory (Ras Beirût) come worked flakes and 'points' which suggest the palaeolithic Cave-period; and a white hand-axe of Drift type, given by Mr. B. K. N. Wyllie, should be noticed from the vicinity of Beersheba, as well as serrated flints from Tell el-Hesy (Lachish), which are now proved by Sir Flinders Petrie to have been inserted in grooved wooden handles forming sickles. Others found near Jerusalem are exhibited, with a series of yellow flint implements approaching the celt form, apparently later than the hand-axes found in this neighbourhood. Beyond the Jordan, surface finds from the Wady Sir, presented by Mr. St.

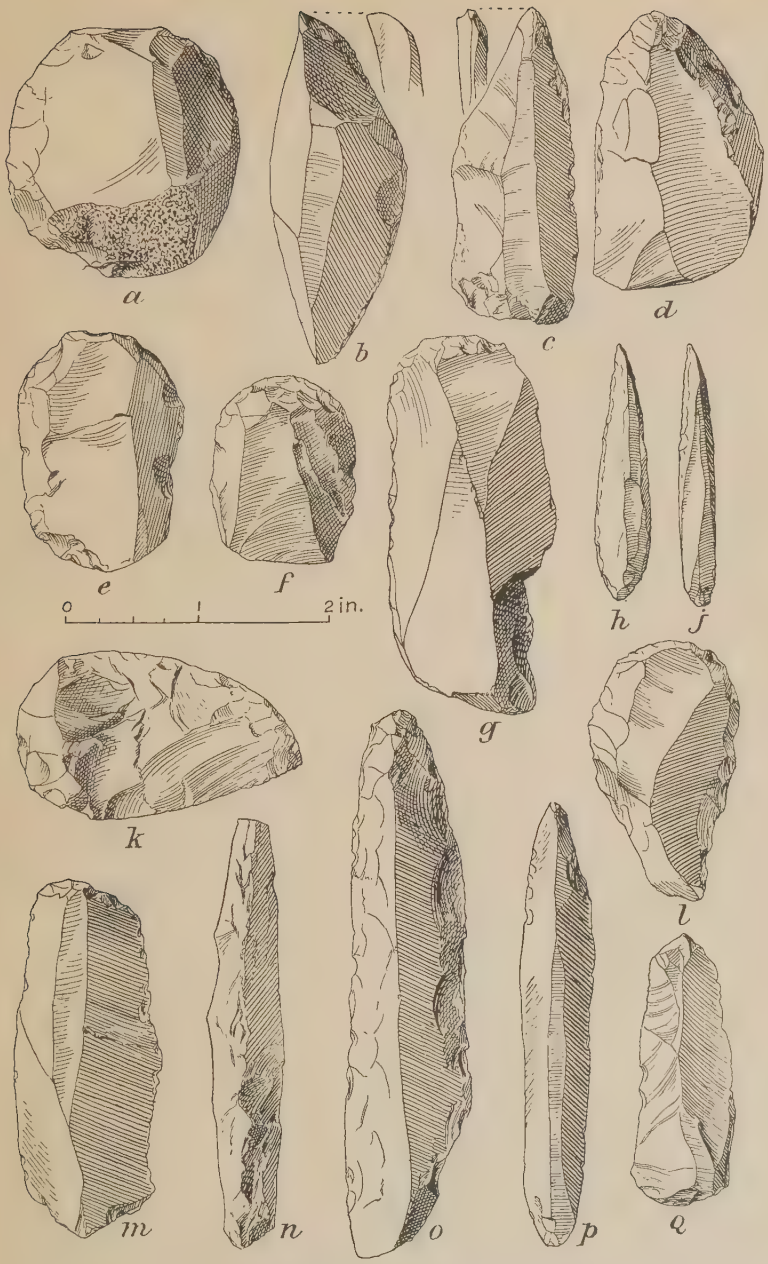


Fig. 199.—Series from cave near Beirût, Syria.

John Philby, are mostly of biscuit-colour but some ochreous; they are markedly palaeolithic in appearance but not all of the same type of hand-axe.

The chert hoe (fig. 200), acquired in 1856, was said to have come from Babylon, but may have been discovered by Captain J. E. Taylor at Muḳayar (Ur of the Chaldees). It is now known to be a common Mesopotamian type, and no less than 400 were collected from the surface in 1918 by Mr. Campbell Thompson at Abu Shahrain (the ancient Eridu), south of the Euphrates marshes. They imply a certain amount of agriculture, but their precise date cannot at present be given.

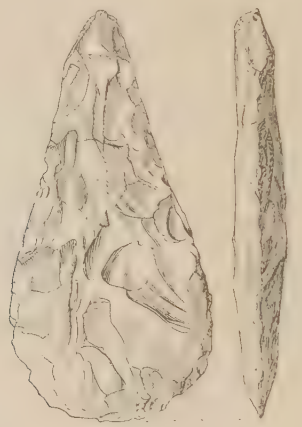


Fig. 200.—Chert hoe, Mesopotamia. ($\frac{1}{3}$)

At Makertou, about 70 miles north-east of Baghdad, Mr. W. R. Smellie collected a number of small chert cores, the material there disappearing beneath the alluvium of Iraq, and only accessible to the inhabitants of the plain on the edge of the Persian mountains. Specimens have been presented by the Anglo-Persian Oil Co. (drawer in Case S), and strikingly resemble the well-known Rohri Hills type (fig. 215), some 1,400–1,500 miles distant across the mountains. The same peculiar culture may be presumed on both sites, but communication must have been difficult except by sea. In Case 144 are three diminutive celts of jade-like stone found near Mosul, the largest being under $1\frac{1}{2}$ in. long: they must belong to the same civilization as those of Asia Minor and the Greek Islands. From Tiflis (Caucasus) comes a surprising blade, 7 in. long, of a yellow smoky chert, in shape resembling those in Cases 139 (Italy), 137 (Jutland), 125 (Brittany) and 123 (Marne, France).

Some delicate arrow-heads from Persia, some of jasper and all of the long pointed oval type like fig. 92, *h*, are exhibited in Case 143, but probably date from the age of metal.

AFRICA

With the exception of Egypt, Africa appears to have passed directly from the use of stone to that of iron, there being apparently no traces of an African Bronze Age. It is impossible to say at what time iron implements superseded those of stone in uncivilized regions, but the change must have taken place earlier in the eastern half of the continent than the west, for in early times migrations in Africa undoubtedly took a westerly or southerly direction. When the great era of African discovery opened in the fifteenth century, natives of the extreme west were already in possession of iron. Only among the Bushmen in the south and the Bube of Fernando Po did stone implements and weapons continue in general use down to modern times (see examples in the Ethnographical Gallery, Table-case 179); in other parts they were regarded as thunderbolts, and held in superstitious veneration.

Varieties of the hand-axe (*coup-de-poing*) are widely distributed over South Africa, from the south coast to the Zambesi, but geological evidence of their age has rarely been obtained. Discoveries have been made in the river gravels above and below the Victoria Falls by Major Feilden and Mr. Lamplugh (specimens in Case 145), also by Mr. Henry Balfour, whose hand-axes in the Pitt-Rivers Museum at Oxford are certainly of palaeolithic types. The gloss on some of the chalcedony flakes has not been satisfactorily explained, nor is it possible at present to account for the different mineral condition of the finds. It has been contended by Mr. Codrington that the gravels below the Falls do not belong to the Zambesi, but have been washed down from the basin of its tributary the Maramba, where serious floods occur even at the present day, depositing quantities of gravel in the neighbourhood of Victoria Falls. Other examples in drawer of Case S, given by Mr. Franklin White.

A find in the Umhlatuzane river valley near Mariannhill, Natal, confirms the opinion that the hand-axes of Africa and Europe belong equally to the Drift period. A specimen of reddish porphyry, quite unrolled and with evident traces of human work, was found in a bed of white sand nearly 20 ft. from the surface. There had been an attempt to make a cutting-edge all round as in the Drift of Europe, but it remains to be proved whether there was a similar development in Africa or whether the hand-axe remained the typical implement till comparatively recent times. Stone implements, symmetrically chipped on both faces somewhat in the St.

Acheul style, are shown from Rustenburg, Transvaal, and from the surface on the Mhabana river, a tributary of the Little Usutu, Swaziland. From the Cape Flats come worked flakes of various stones, including some resembling the so-called points of Le Mousticr and others like the laurel-leaf blades of Solutré. These may simply be chance coincidences, and the pottery looks much later, having countersunk handles: that is, the wall of the vessel is indented to form a passage for a cord or the finger, with openings on either side of a knob or handle.

There are roughly chipped implements of Drift type from the top of Witwatersrand, Transvaal; some large quartzite implements and one smaller, much resembling St. Acheul work, found near Paarl, Cape Town; and several perforated stones of mace-head form. One heavy specimen, found 7,100 ft. above the sea in Ovampoland, is strongly suggestive of the weights on Bushman digging-sticks.

Quartzite flakes have been found in the gravel, Buffalo Drift, East London, Cape Colony; and four quartzite hand-axes from the surface at Alicedale, near Grahamstown, were given by the Albany Museum. Flake-tools come from a cave on the Umdowaan river, Griqualand East, while others from a cave at Broken Hill, North-east Rhodesia, are of quartz. Minute flakes found on the Kalahari Desert with beads of ostrich egg-shell (and probably used for perforating them) may be related to the pygmy implements found in various and isolated parts of the world (*see* also drawer in Case S). The small thumb-scrapers given by Mr. J. A. Swan, with subtriangular hand-axe and pygmy implement from the neighbourhood of Kimberley, resemble those of Mas d'Azil date in Europe (the pygmy period), and the type was found also with flakes and a good crescent implement (like fig. 214, no. 5) in a rock-shelter at Wilton, near Alicedale, Cape Province.

The quartzite and basalt series collected and given by Major E. R. Collins contains several specimens of importance which are known to come from gravel-deposits, and are not surface-finds like most hitherto known in South Africa. Thus at Vereeniging, Transvaal, they lay 4–5 ft. in the gravel of the Vaal River; and gravel at Panfontein near Heidelberg and at Meyerton in the Transvaal produced other examples. Similar discoveries were made in the Western Transvaal at Palmeitpan and west of Klerksdorp (fig. 201); and at Burghersdorp, Cape Colony, a chert implement came from gravel now 50–60 ft. above the stream, implying extreme antiquity. An amygdaloid example (fig. 202) of basaltic rock came from the surface at Riversdale farm, on the high watershed between the Orange and Caledon rivers: the faces are flat and convex.

Want of space in the upper gallery has necessitated the exhibition of large African collections in the glazed cupboards at the north

end of Table-cases A, C, and G in the Prehistoric Room below, but their description may be added in this place. The series found on the top of river-gravel at Taungs, 40 miles south of Vryburg in the

Fig. 201.—Chert hand-axe, Klerksdorp, W. Transvaal. $(\frac{2}{3})$

Fig. 202.—Basaltic hand-axe, Riversdale, Orange Free State. $(\frac{1}{2})$

Cape Province, includes several of palaeolithic appearance, broad flakes and small tortoise-cores, given by Rev. Neville Jones, who recognizes three different cultures in stratified deposits before the arrival of the Bushman in this neighbourhood. Mr. Horace T.

Brown's gift of six quartzite palaeoliths represents a large quantity found between Stellenbosch and Paarl at the Cape.

In Case C are large tortoise-cores and hand-axes of dolerite presented by Mr. F. J. Jansen and found near the ancient outlet of a lake (which has disappeared) at Victoria West, Cape Colony. Several were found resting on the conglomerate below 12 ft. of alluvium, and it should be noted that some hand-axes, but no tortoise-cores, were found in the conglomerate. The latter type was struck at the side, not at the end. In the adjoining Case G are three boards of specimens representing a large number picked up from the surface of De Put Farm, Orange Free State, by the donor, M. Leviseur. Some have lost their original surface, which peeled off like the rind of an orange; but all are hand-axes of normal types and may well belong to the Drift period, which is now generally recognized in South Africa.

A few more South African specimens are exhibited in drawers on the north side of Case S (on the opposite side of the Central Saloon). Besides the Kalahari desert, Natal and Kimberley diamond-fields are represented; and from Bulawayo Museum come flakes in the style of Le Moustier, found in gravel in that neighbourhood.

A suggestion has recently been made by Dr. Menghin to divide the Tumba culture of the Lower Congo into (i) late palaeolithic with a preponderance of hand-axes, without pottery or arrow-heads, and (ii) early neolithic with pointed or leaf-shaped blades, pottery, and arrow-heads. The earlier series may be linked with Somaliland (p. 186) by the quartzite implements found in Uganda (p. 185), but the specimens from West Africa exhibited here can hardly be fitted into the scheme. There are quartzite implements of laurel-leaf and oval forms from the country between Matadi and Stanley Falls (Case 145); and haematite celts with pointed butts (fig. 203) from Mount Tina on the north bank of Bomokandi river (Welle district, Upper Congo), which are used by the natives as charms (Case 146).

A well-known cylindrical type from West Africa is represented by specimens (fig. 204) from Odumasi, near the Volta river; from the province of Aquapim, on the Gold Coast; and from a site 15 miles south of Kumasi, Ashanti.

Far to the north-west finds are plentiful in the western Sahara (W. Mauretania), and Lieut. Dangelzer's gift in Case 147 includes points, scrapers, and arrow-heads mostly worked on one face only. The last have either hollow bases (as fig. 92, *a*) or are barbed and tanged, elsewhere a sign of later date; but the two squat celts of polished basaltic stone may belong to the local Neolithic. In the lower part of Case 148 and in two drawers of Case S are shown a number of hand-axes and flake-implements from the centre of the western Sahara (near Timassinin on the Tinghert plateau) that

PLATE XI.—CHERT IMPLEMENTS OF PALAEOLITHIC FORM, SOMALILAND.

(Case 147, *see* p. 185)

certainly have a palaeolithic appearance in spite of their occurrence on the surface of the desert, where Dr. Fromholtz found many besides those presented to the museum; and human occupation has been proved much farther east, in the Siwa oasis.

The palaeolithic period in Algeria is represented by the cast of a hand-axe from Batna, and all doubts as to the existence of the period were set at rest by the discovery of the bones of extinct animals in conjunction with implements at Lake Karâr. Some arrowheads from the collection of the first Lord Avebury are worked on both faces (unlike some from the western Sahara), but those with barbs from dolmens at Guyotville, near Algiers, may be later

Fig. 203.—Celt of haematite, Upper Congo. ($\frac{1}{3}$)

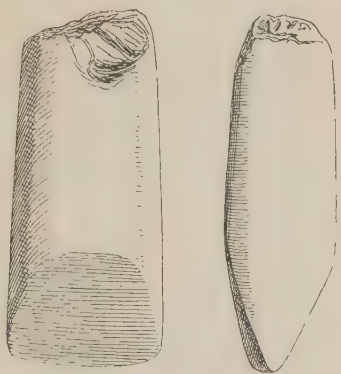


Fig. 204.—Cylindrical stone implement, Gold Coast. ($\frac{2}{3}$)

than the pure Stone Age, as a similar specimen was found with a bronze armlet at Staouli.

In a drawer of Case S are exhibited two series recently presented by M. Reygasse who has ventured to date surface-finds on the Algerian border of the Sahara. On one board are eight hand-axes of late Drift type from Touïbia, 43½ miles south of Tébessa; and on another smaller implements of brown lustrous flint, unequally patinated, from S'baïkia, 37¼ miles south of Tébessa, referred to the period known as *proto-Solutréen* (predecessor of Solutré) and characteristic enough to justify a S'baïkian culture for the north of Africa. It is possible to see in these small thick ovates a link between St. Acheul and Solutré, but it must be remembered that the Capsian culture, which gave birth to that of Aurignac in Europe, continued in Africa with little change through the European periods of Solutré and La Madeleine. In fig. 205 are represented varieties of the pointed ovate in question, and a celt-like implement (*d*) with a kind of bevel at one end. The smaller specimens

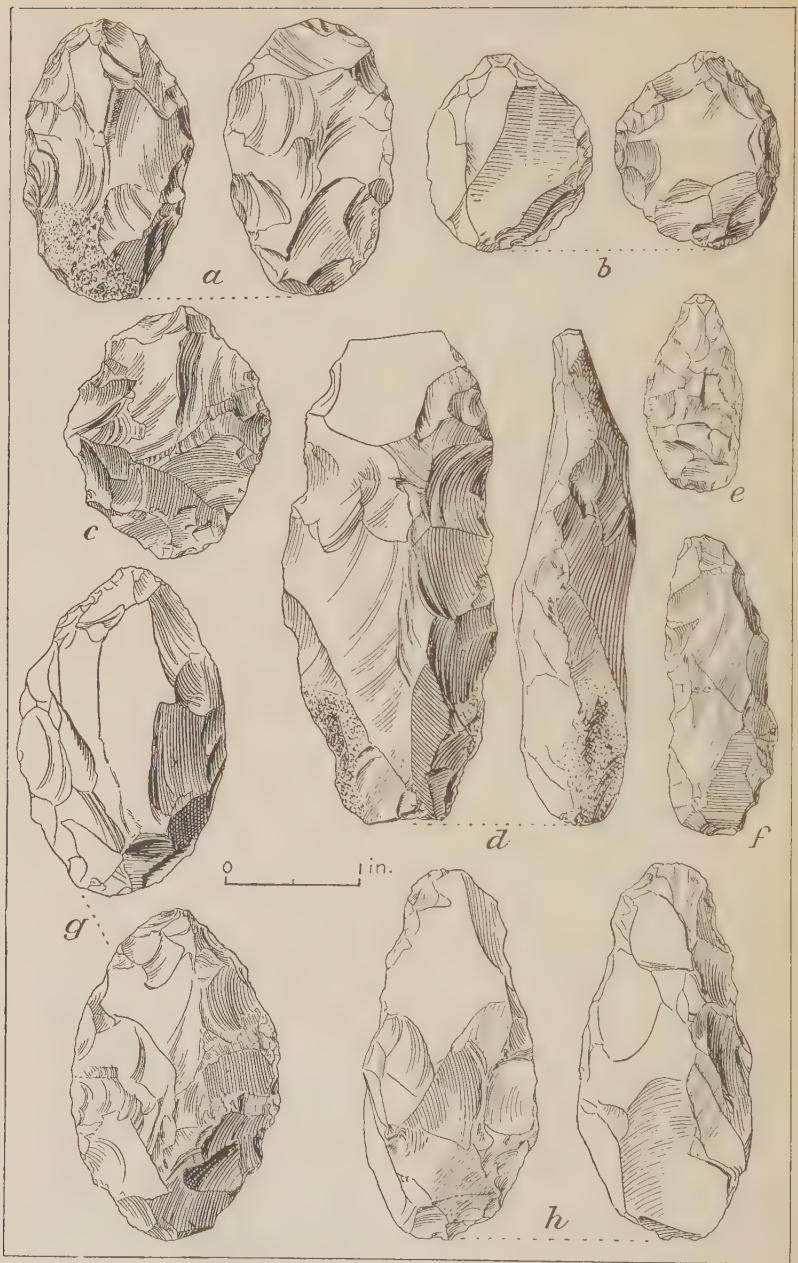


Fig. 205.—Series from surface, N. Sahara.

(*e*, *f*) are not far removed from the early Solutré type (fig. 130), but the majority are thick in the centre and somewhat roughly flaked.

Prehistoric conditions in the heart of Africa have always been obscure, but if the occurrence of palaeoliths in the south is admitted, there can be little objection to the theory that the culture of Le Moustier extended from one end to the other of this continent. Characteristic 'points', tortoise-cores, and the Levallois flakes with facetted butt have been noted in Egypt, Somaliland, Victoria Falls (Zambesi), and the Cape. In the lower part of Case A are massive hand-axes of different types, with other implements having the under face quite flat, discovered near Sango Bay on the west side of Lake Victoria (Victoria Nyanza) by the donor, Mr. E. J. Wayland, director of the Geological Survey of Uganda. The material

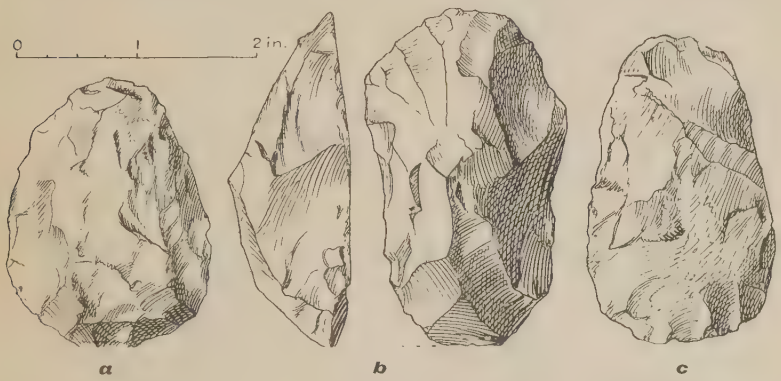


Fig. 206.—Three quartzite implements, Tendaguru, Tanganyika.

is quartzite, and the factory-sites yielded specimens of Drift and Le Moustier facies, besides long and heavy picks which are only comparable to some from Egypt in Case 148.

An interesting series of quartzite and chert implements was collected from the surface at Tendaguru (about 50 miles N.W. of Lindi), Tanganyika, by Mr. L. S. B. Leakey while on the East Africa Expedition of 1924. These with work on one and both faces are mounted on separate boards in a drawer of Case S, and include hand-axes (fig. 206, *a*), flake-implements, carinated (keeled) planes (*b*), and primitive celts (*c*), but it remains to be proved whether they are all of one period.

Mr. Leakey has also presented a series of obsidian cores, flakes, and scrapers (Case 146) from the surface, mainly at Kabete in Kenya Colony; and various types are represented but there is, nothing to suggest any difference in their age, which is uncertain.

In Case 147 are selected implements (pl. XI) obtained in Somaliland in 1894 and later by Mr. H. W. Seton-Karr, who presented

these and a large number from Egypt in the adjoining Cases. In form the larger hand-axes are strikingly similar to those of the river-drift in Europe: they were not, however, found under similar geological conditions, but on the slopes of a hill near the Issutugan river, having been apparently exposed by the action of rain, about 200 ft. above the present level of the river. As is usual in Africa, bones of extinct animals were not preserved, but a palaeolithic origin is now generally admitted for the hand-axes as well as the smaller implements, which are found over a wide area and include 'points' of Le Moustier type and other forms that can be easily matched from the European Caves.

EGYPT

It is now commonly agreed that the north-east corner of Africa was occupied by man at a very remote period, and that Egypt had a palaeolithic age. At that distant time the fertile country was not, as at present, confined to the valley of the Nile. Districts on both sides of the river, which are now barren, then received a plentiful rainfall, and were covered by a profuse vegetation. Most of the Egyptian implements which resemble those found in the river-drifts of Europe have been picked up on the surface of the desert, and as a rule there is little to determine their age other than their palaeolithic form and the condition of their surface. Flint long exposed to the scorching sun of Egypt becomes tinted in many gradations of colour varying from a pale buff to deep orange brown, but it would be hazardous to assume a connexion between the antiquity of an implement and the comparative intensity of its discoloration. More reliable evidence of age is afforded by General Pitt-Rivers' discovery in 1881 in the neighbourhood of Thebes of flint tools, undoubtedly chipped by man, lying embedded in indurated gravel of a very ancient formation, and by more recent discoveries of implements in similar positions by Sir Flinders Petrie and Prof. Seligman. The one thing needful, however, the presence with the implements, in an undisturbed stratum, of remains of animals belonging to species now extinct, has not yet been produced from Egypt. The tendency of ancient forms to persist through later periods should therefore caution us against assigning *all* Egyptian finds of palaeolithic appearance to the age of the European drift; for, in the words of General Pitt-Rivers, 'flints found on the surface of the soil cannot be legitimately disconnected from flints of the surface period except by form; and form alone is not conclusive in determining date.'

If the Drift types are to be referred to the palaeolithic period, others may imply a subsequent neolithic stage, but little is known

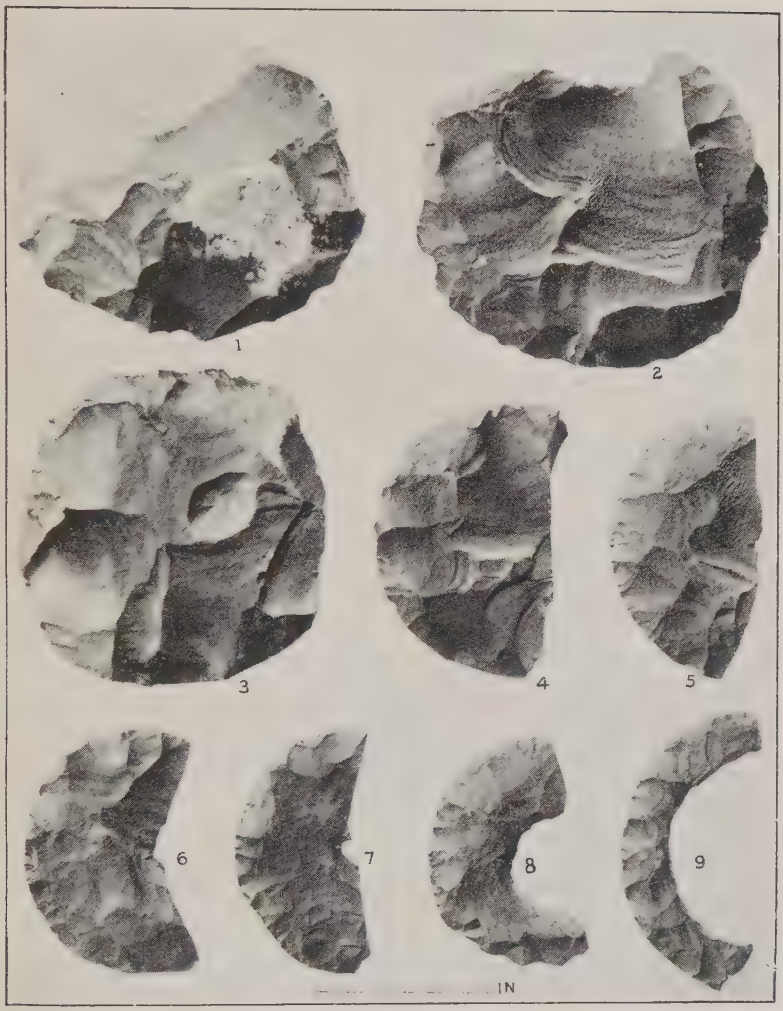


PLATE XII.—STAGES IN MANUFACTURE OF FLINT ARMLET, NILE VALLEY.
(Case 150, *see* p. 188)

of that period in spite of the extant material. What is called the pre-dynastic period has not at present been measured in years, and is not a true neolithic period, as copper is found even in its earliest stages, when the tall red-ware jars with black rims were being produced (Case 49); but stone was also in constant use, and reached its highest development before the dynasties began.

The use of stone implements in Egypt was not confined to the prehistoric period which ceased about 3500 B. C., but was continued for domestic as well as ceremonial purposes into historical times. Certain forms of stone axes have even been associated with particular dynasties. In Case 152 are exhibited axes of characteristic shape ascribed to the 12th dynasty (about 2212–2000 B. C.) and found at Lahun ('Kahun'); they are similar in shape to bronze axes from the same site, and it is supposed that the one form was derived from the other. Flint scrapers are shown from a tomb of the 4th dynasty at Meidūm (about 3100–2950 B. C.); also flint knives, scrapers, and flakes from tombs of the first two dynasties (? 3500–3200 B. C.) at Abydos, some accompanied by copper implements and models of implements, the whole excavated by Prof. W. M. F. (now Sir Flinders) Petrie, and given by the Committee of the Egypt Exploration Fund (now Society). The resemblance of a common form of scraper (fig. 207) to some from the French caves should be noticed.

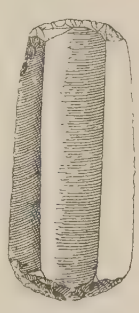


Fig. 207. — End-scraper from tomb, Egypt. (⅔)

Cases 148, 149 contain a series of flint tools, of various types and patinations, found in the desert on the west bank of the Nile near Thebes and given by Mr. H. W. Seton-Karr. The two faces are rarely coloured alike, and the difference is no doubt due to their unequal exposure on the surface, where an enormous quantity of tools and flint débris belonging to various periods has lain undisturbed for ages. The prevailing chocolate colour varies in shade, and some examples are almost black. In dealing with a large number allowance can be made for accidents, and some of the forms are consistent with a palaeolithic date for these deeply coloured specimens.

A contrast is provided by a group from Lower Ombos, given by Sir Flinders Petrie, which are greyish brown and much better made: there are small ovates, a good conical core, and a humped implement very like one from Tanganyika (fig. 206). Two other specimens, given by Mr. Franklin White, can be matched in equatorial Africa (p. 185)—a sand-worn ovate of chert and a notched blade of obsidian, both from Abyssinia.

Two quartz hand-axes from Demhid on the Nile (14 miles south of Aswān) were given by Capt. H. G. Lyons; and an excellent

example of the struck tortoise-core in rich brown flint from Thebes, measuring $5\frac{1}{2} \times 5$ in., is the gift of Mr. Buscall Fox. A good series of pygmy implements (Lord Avebury's collection) is shown, with some larger than usual from Helwān, 2 miles east of the Nile and 15 miles south of Cairo, about 115 ft. above the river. This is one of the best-known localities for these diminutive tools, which are generally assigned to the Tardenois period (p. 19). Some chert flakes, with signs of heavy use, come from ancient mines at Wady Maghārah, Sinai, and there is a series of thin triangular implements (some broken and joined) which have the broad cutting-edge nearly straight (like pl. XIII, no. 2).

Fig. 208.—Chipped flint knife, Sheikh Hamadeh, Egypt. ($\frac{1}{2}$)

Fig. 209.—Chipped flint knife, Tell-el-Amarna, Egypt. ($\frac{1}{3}$)

Not unlike these are three finely chipped flint hoes in Case 150, found at Qau al-Kebir and given by the British School of Archaeology in Egypt; and in the same Case the process of making flint bangles, as discovered by Mr. Seton-Karr at Wady ash-Sheikh, is illustrated on a board: two finished specimens are shown from Ḥau (Diospolis Parva) and Sheikh Abu'l-Ḳūrna, near Thebes, and a third came from a tomb of the 1st dynasty (? 3500–3350 B.C.). A thin disk (pl. XII, nos. 1–3) was perforated in the centre and the hole gradually enlarged (nos. 6–9), but the operation was extremely liable to result in fracture (nos. 4, 5), and few reached the final stage of polishing. Though the Egyptian and Assyrian Department has a more imposing series, the flint knives (figs. 208, 209) in this Case and Case K below are among the finest flint products in existence, and date from just before dynastic times. At that time the blades were polished *before* chipping, and the ripple-effect was produced by pressure along the edges. Comparable in technique are the thin triangular blades with the broad end split like the

tail of a fish (examples from Ḥau and Abydos). These are supposed to have had the point inserted in a shaft and been used as missiles for hamstringing animals. The edges are often serrated with extreme delicacy, as are knives of the best period, but in early dynastic times the latter changed in form and deteriorated in quality (one from Abydos with handle in Case K).

From the Fayûm (formerly a large lake) have come large numbers of flint implements, for which no date or sequence has so far been established. A small series in Case 150 contains serrated blades proved, by Sir Flinders Petrie's discovery of complete specimens, to have been the teeth of sickles; and the friction due to reaping crops has in some cases given the edges a porcellanous surface resembling the 'gloss' due to natural causes (p. 59).

Polished black stone celts, of somewhat squat form, from Koptos and Abydos bear a general resemblance to those from other parts of the Eastern Mediterranean (as fig. 195); and two diminutive celts, of agate and amber respectively, are pierced at the butt for use as amulets (p. 109).

Above are flat utensils of schist, some intended to represent animals, and sometimes used as palettes on which colours were rubbed. These objects may have had a totemic significance and were made throughout the pre-dynastic period, during which the outlines gradually lost their naturalistic character, and became merely symbolic. The lozenge was a favourite form, and conventional animal-shapes are also exhibited. Others are in the Egyptian and Assyrian Department.

In the lower part of Cases 150, 151 are chipped implements from the Wady ash-Sheikh and the Wady Sagûr, in the desert to the east of the Nile half-way between Cairo and Asyûṭ, where they were discovered by Mr. H. W. Seton-Karr in 1896. Besides axe-like implements, knives, and cores there are clumsier tools like picks with triangular section, considered to have been used for agricultural purposes. Though some of the specimens have analogies with those of the Drift period in Europe, the majority, if not all, belong to pre-dynastic and dynastic times. They were discovered on the surface, around shallow pits from which the chert had been extracted, situated in terraces descending from the plateau to the dry valleys, and on ledges on the sides of the cliffs. The pits often surrounded a central working-place where the raw material was chipped into shape. An interesting feature of this find is the counterchanged appearance of several specimens (pl. XIII), showing the unequal weathering of different portions of broken implements. Fragments belonging together have been lying exposed on the surface for an indefinite period on different faces, and when again joined together show different degrees of patination. The original colour of the best flint in Egypt, always of a somewhat cherty nature, is fawn sometimes with a pinkish hue,

and exposure to the atmosphere alters it to a chocolate or chestnut brown or even black, the shades varying according to circumstances. This should serve as a caution against dating implements by their degree of patination, which is, however, a useful index of horizon in the case of stratified deposits. It should be observed that exposure on the surface plays an important part in patination, and it is a question whether burial in gravel has any appreciable effect on flints, which are often patinated before they reach that position.

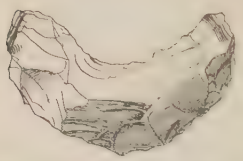


Fig. 210.—Crescent implement, Egypt. (½)

Case 152 contains several groups of flints from early dynastic tombs which often contain copper, the first metal used for tools. Three crescents (fig. 210) were found near the tomb of King Khetneter Zoser at Beit Khallāf in Upper Egypt, and four similar were found in

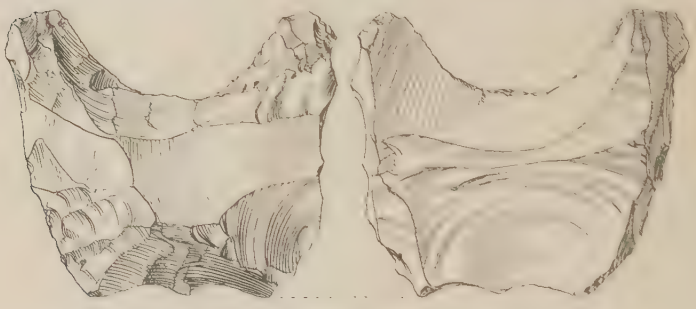


Fig. 211.—Hollow-scraper, Erment, Egypt. (½)

the tomb itself, but all are much flaked on both faces and differ in that respect from those made from tortoise-cores (fig. 211). Two oval outer flakes of scraper form should be noticed as the working edge is in each case serrated, and they have been regarded as combs, but Sir Flinders Petrie notes their resemblance to iron scrapers for removing scales from fish. The two axe-heads from Lahun ('Kahun'), of flint and stone respectively (figs. 212, 213), are attributed to the 12th dynasty (*c.* 2212–2000 B. C.) and may be connected with the copper form in Case K below. In Egypt it is a local type, but something like it in stone is found at St. Vincent in the West Indies. A small perforated mace-head of crystalline limestone, also from Lahun ('Kahun') is very like one from Hierapolis, Asia Minor, in Case 143, and some connexion under the 12th dynasty is not excluded.

Slate palettes and Helwān flints shown in this Case have been already referred to on pp. 189, 188; and on the wall adjoining is

PLATE XIII.—BROKEN IMPLEMENTS SHOWING UNEQUAL WEATHERING, EGYPT.

(Cases 150–1, *see* p. 189)

a case containing a series of stone implements in use by existing primitive races: they serve to illustrate the possible uses of prehistoric implements and the methods of hafting them.

Cases 49, 50 are immediately below those just described and continue the Egyptian series. In the middle is a series of predynastic pottery made without the potter's wheel some time before 3500 B. C., and of surprising excellence both in form and colouring. The red-ware vessels are finished near the top with a black deposit (made by heaping cinders round that part of the vessel when

Fig. 212.—Flint axe-head, Lahun, Egypt. ($\frac{1}{3}$)

Fig. 213.—Stone axe-head, Lahun, Egypt. ($\frac{1}{3}$)

inverted for firing), and one bowl is thus coloured all over the interior. A thicker pinkish ware has painted decoration consisting of spirals, lattice and herring-bone patterns, and also a design that has been variously interpreted as a ship or enclosure (kraal) perhaps periodically surrounded by water: recent opinions are in favour of the ship, a conspicuous feature of the Nile. On the right is a flint series of palaeolithic forms and several 'hollow-scrapers', presented by Mr. Montagu Porch and found on low spurs and terraces above Thebes and Erment, Upper Egypt, and 550-800 ft. above the Nile. Others from the High Gebel plateau in the Western Thebaid were 1,000 ft. above the river. Special attention has been drawn to the 'hollow-scraper' by Prof. Seligman, who has found its origin in reduced tortoise-cores, the original point of percussion and part of the flake-bed being seen on the right of fig. 211. The notch was produced later with a single blow, and there are generally signs of use on one face of it, probably for smoothing the shafts of spears.

A few flints accidentally polished by the sand are shown from the neighbourhood of Girgeh, Upper Egypt; and several refitted flakes come from a 3rd dynasty tomb at Meidūm.

Below is a selection from Mr. Porch's collection including Levallois flakes with facetted butt, thick leaf-shaped implements, worked flakes, arrow-heads, and hand-axes now recognized as parallel to the Lower Palaeolithic of Europe. To the left is a group of unpatinated flints fresh from the pebble-and-chalk conglomerate band in the cliffs of the Wadiyein, Thebes (indicated in the adjoining photograph), which have been protected from patinating agencies. Specimens of a large series presented in 1905 by the late Dr. Schweinfurth are exhibited in drawers of Case S: all are from the district of Thebes in Upper Egypt, and were collected to illustrate the transition from eolithic to palaeolithic forms.

INDIA

The geological evidence afforded by the formations in which chipped implements of palaeolithic type have been discovered may be held to prove the existence of a palaeolithic age in India. Mr. Bruce Foote has shown that in the valley of the Sabarmati River in Gujarat a vertical distance of about 200 ft. separates the neolithic implements found on the surface from those of more primitive form buried beneath the alluvium of an ancient river system below. Moreover, the nature and depth of the intervening deposits justify us in assigning a very great antiquity to the implements which underlie them. Similar, though less perfect evidence, is supplied by the discovery of rudely chipped tools of quartzite embedded in the laterite (red ferruginous clay) which clothes the flanks of the Eastern ghats in the Madras Presidency. To these beds a marine origin has been attributed by some geologists; and if this theory is correct, their presence, in some cases at an elevation of 370 ft. above the present sea-level, would indicate that the coast has been raised to this height since the time when the men who made these rude implements occupied the district. Other authorities, however, consider the laterite to be a freshwater deposit. The presumption of high antiquity on geological grounds is confirmed by the forms of the implements themselves, which often strikingly resemble those of the ancient river-drifts of Western Europe. It is much to be regretted that these Indian strata have hitherto afforded no example of primitive implements lying in undisturbed association with the bones of extinct animals.

In Cases 42,43 are quartzite implements of palaeolithic form from these laterite beds in the Madras, Nellore, North Arcot, and Cuddapah (Pennar valley) districts of southern India, with series of rudely chipped specimens from Mirzapur (Singrauli basin) and Raipur (on the Jumna) in the North. In 1883 Mr. J. Cockburn found several along the bank of the Balliah Nadi, South Mirzapur

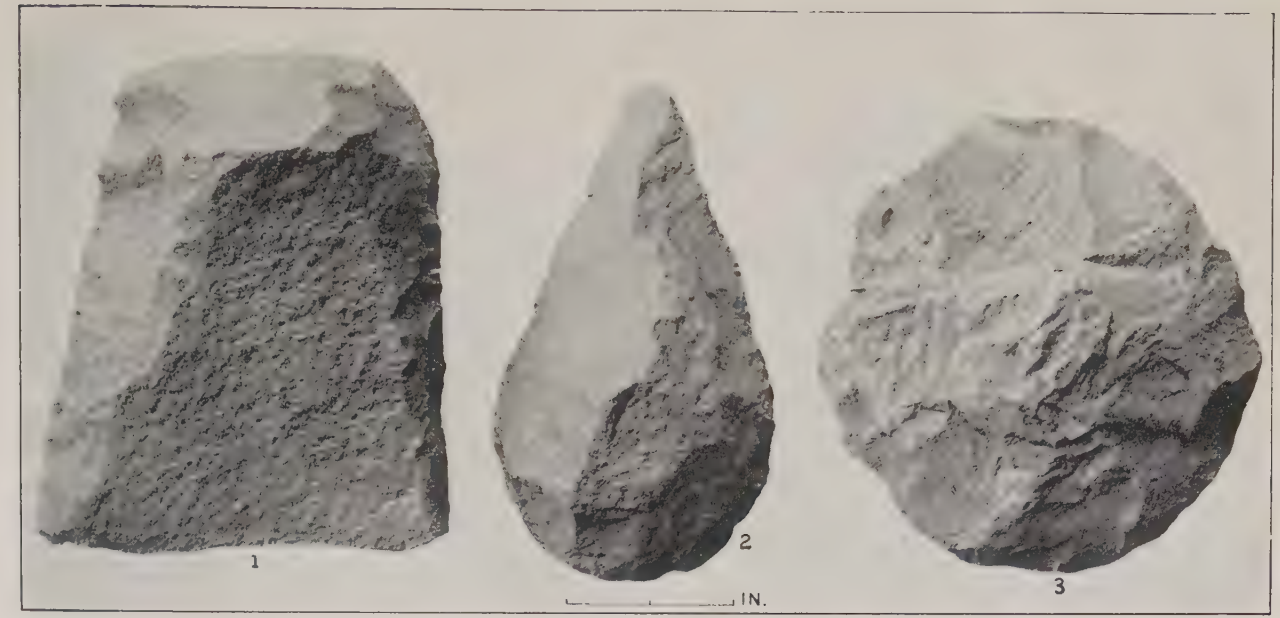


PLATE XIV.—QUARTZITE IMPLEMENTS FROM LATERITE BEDS, MADRAS.

(Case 42, *see* p. 193)

in Bengal, in a gravel bed which in places lay beneath an alluvial stratum varying in thickness from 2 ft. to 14 ft., and at the latter depth one was chiselled out of the concreted gravel (section in Case 43).

Those illustrated in pl. XIV all find a parallel in the river-drift series from Britain and may well belong to the same period. With the wedge-shaped implement (no. 1) should be compared the flint in Case 64 from a contorted drift at Stoke Newington, London; no. 2 is of the common pear-shaped type, and no. 3 closely resembles several in flint exhibited in Case 70 and found in drift-gravel at Santon Downham and other sites in Suffolk (fig. 48). The huge quartzite hand-axe, 9 in. long, found by Mr. Seton-Karr in Madras is of the same order as those from Mr. Worthington Smith's collection in this Case.

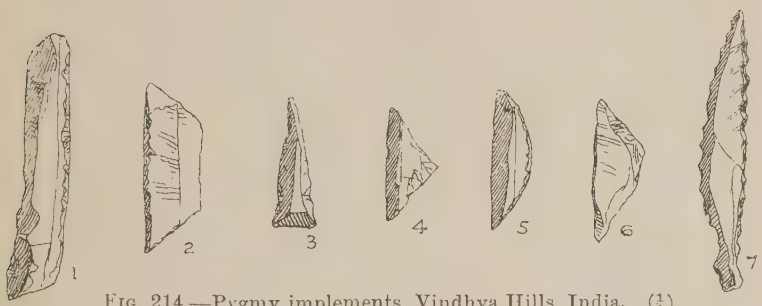


Fig. 214.—Pygmy implements, Vindhya Hills, India. ($\frac{1}{1}$)

Mounted on boards in Cases 44, 45 are flakes and cores of chert, jasper, chalcedony, &c., from the Vindhya Hills, and from Jabalpur in the Central Provinces. Some of the worked flakes are exceedingly minute (fig. 214) and show forms characteristic of the so-called 'pygmy flints', found in widely distant parts of the world (p. 89). They are not mere chips from a factory floor, but often tools in themselves, carefully worked to a definite pattern, and used for some purpose as yet unknown.

Here are triangles (nos. 3 and 4 isosceles, no. 6 scalene), crescents (no. 5), and trapezes (no. 2), the last being rare in Britain and apparently later than the Tardenois series (p. 91).

Specimens are shown of the abundant flakes and cores of cherty flint from the Rohri Hills opposite Sakkar (Sukkur) on the Lower Indus (fig. 215), which are found in considerable quantity but not in association with any finished implement; and their date is at present indeterminate, but their interest is increased by the recent discovery of close parallels north-east of Baghdad (p. 178).

These Cases contain principally chipped and ground stone axe-heads, hammers, and other implements given by Sir Alexander Cunningham from the Kaimur range in Central India: others

from the North-west Provinces (fig. 216) and the Shevaroy Hills in the Madras Presidency. The chipped specimens (as some from the Banda district, west of Allahabad), given by Mr. Rivett-Carnac, are generally ground at the cutting-edge, and all are doubtless of the same period, there being no Drift types in this series. The natives regard them as thunderbolts, and place them under the sacred pipal trees in their villages. A similar series from Bellary, Madras, given by Mr. H. T. Knox, is on the floor of Cases 42, 43. Various hollowed stones (p. 115) will be noticed, both oval hammers and celts, but here at least there can be little doubt that the hollows are the beginnings of shaft-holes or grooves, which

Fig. 215.—Flint core, Rohri Hills, India. ($\frac{2}{3}$)

Fig. 216.—Stone celt, N.W. Provinces, India. ($\frac{1}{4}$)

have never been completed. There are also grooved mallets (like fig. 185), and heavy ring-stones like the weights on the Bushman digging-sticks of South Africa.

SOUTH-EASTERN ASIA

The recent exploration of many caves in Indo-China by officers of the French Geological Survey has established two neolithic horizons—the upper yielding the typical shouldered celt polished all over (as fig. 217), recognized as late neolithic here and elsewhere, and the lower characterized by ovate implements of rhyolite, quartzite, and other rocks, recalling the palaeolithic hand-axe but associated with rough celt-like implements polished at the cutting end. Specimens of the later neolithic are exhibited in Cases 47, 48,

including the chisel-ended implement with square tang, and celts of oblong section given by Dr. Capitan. Those from the Great Lake district of Cambodia are similar, but accompanied by ornaments of shell and rings of stone, recalling those from France and Egypt. The shouldered axe extends to Burma (fig. 217) and the southern Shan States; a series of them with celts of various forms and materials from the Kachin Hills in the Bhamo and Myitkyina districts of Burma and the adjacent Shan States has recently been presented by Mr. N. G. Cholmeley. There is another type which is common to south-eastern Asia, with one or two flat faces and a sloping end (probably for use as a hoe), either angular

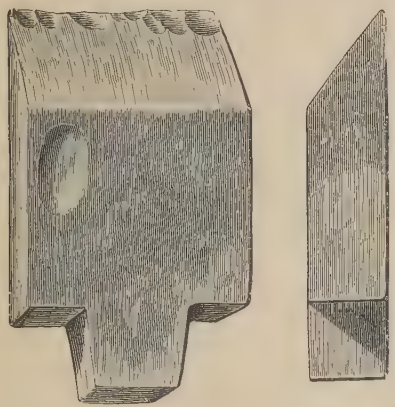


Fig. 217.—Stone adze-blade, Burma. ($\frac{1}{2}$)

Fig. 218.—Stone implement, Negri Sembilan, Malacca. ($\frac{1}{4}$)

(fig. 218) or rounded, like those shown from Sumatra and Negri Sembilan in the Malay peninsula. Flat celts, with oblong section and bevelled cutting-edge (which is flush with one face, not central), are evidently characteristic of this region: Malayan examples both from Perak and Negri Sembilan; and from Java, in addition, comes a curious type like a combination of figs. 218 and 186.

NORTHERN ASIA

Blades of jasper much like the larger specimens from the Vindhya Hills have been found by Sir Aurel Stein on an ancient caravan-route in Chinese Turkestan, associated with small arrow-heads of spindle form; but little is known of the true Stone Age north of India, and the only Siberian specimen in Case 142, given by Mr. Dudgeon, is partly polished and has a general resemblance to the Nöstvet type of Scandinavia (fig. 171).

A well-made arrow-head of slaty stone, 4 in. long, is shown from S. Corea, and is best compared with those of the Arctic culture of Scandinavia (p. 159). It is possible that in the high latitudes of Europe and Asia there was a uniform civilization, at least in the neolithic period.

Farther south recent discoveries have yielded good evidence of a palaeolithic period, and there is a prospect of dating the loess in China as in Europe. In the Ordos (within the great loop of the Hoang-Ho south of Mongolia and north of Shensi) that important deposit, which is partly wind-borne, contains quartzite implements of Le Moustier and later palaeolithic stages with the appropriate fauna. There is a conglomerate (mainly calcareous concretions) at the base; the middle strata contain freshwater shells; and the true loess above, with land-shells, is surmounted by 3–10 ft. of black soil attributed to the neolithic period. The yellow earth, which is consolidated dust, extends from the south of the Ordos to Lake Baikal, and links up with that of Siberia, Turkestan, and eastern Europe.

Fig. 219. Part of 'thunder-mallet'. Japan. ($\frac{1}{4}$)

Cave-deposits have been found at Sha Kuo T'un in Fengtien, including small stone celts, stone rings (as in France, p. 147), and pottery, some of which is coloured, and hollow-based arrow-heads, but these finds are not represented in the Museum. There is a fine polished celt (axe-head) of black stone, 9 in. long, from Momein in Yunnan (S. China), somewhat resembling a Scandinavian form with squared sides (fig. 172, no. 2), but furnished with a chisel edge flush with one face; and the same locality has yielded small celts of various stones, hardly fitted for use, which have a general resemblance to those from Asia Minor (fig. 195) and the Greek islands. A celt found on Gützlaff island (off Shanghai) has an oval cross-section and is smoothed all over by grinding. Kamtchatka, a peninsula in the same latitude as Britain, is represented in Cases 47, 48 by rudely chipped axe-heads of a slaty stone not unlike the German type (fig. 186), net-sinkers, and 'points' of obsidian and jasper—all from shell-mounds or kitchen-middens left by a population more primitive than their neighbours to the south.

The remains of the Stone Age in Japan (Cases 40, 41) have been chiefly found near the coast, and in those parts of the islands which are known to have once been inhabited by the ancestors of the present Ainu of Yezo and Saghalien. The most primitive implements are those discovered in shell-mounds resembling those of Europe (p. 155): they occur in association with broken pottery and remains of the deer, boar, fox, and bear, the hollow bones being frequently broken, probably with a view to the extraction

of the marrow. Some of the designs impressed upon the pottery recall those which the modern Ainu still carve on their wooden utensils or sew on their woven garments. The formation of these shell-mounds must have extended over a long period, for they are found not only at many points on the coast of the main island, but also far south in Kyūshiū, where the Japanese crossed from the mainland at an unknown time before the Christian era. The invaders were from the first in possession of bronze, while their pottery was quite different in character from that of the Shell-mounds. As they steadily drove the Ainu northwards, the more

FIG. 220.—Chipped stone knives, Japan. ($\frac{2}{3}$)

southerly shell-mounds may be considered to date at least from several centuries B. C. Those farther north may be proportionately less ancient as they approach the district still occupied by the Ainu, that people having learned the use of metal only in comparatively modern times.

Many large fragments of pottery with impressed designs come from shell-mounds in the province of Musashi, handles and spouts being evidently in use. An example of the curious stone objects, called by the modern Japanese 'thunder-mallets' (fig. 219) was found on the same site, perhaps a symbol of authority. Ground stone axes of various types both with oval and oblong section, chipped knives, arrow-points, and drills, many being of obsidian, come chiefly from Hakodate, Yezo; and especially characteristic are the small knives with projecting knobs at the butt or back, probably to afford a hold for binding it to a thong (fig. 220). Below is pottery with incised and stamped designs,

including some perfect vessels; fragments of stone 'thunder-mallets'; and a series from kitchen-middens (shell-mounds) at Otaru, Yezo, where obsidian arrow-heads are seen to predominate. The type with concave base is the commonest here and at Ugo, W. Japan (gift of Prof. Yoshito Harada); but tanged specimens also occur, and the barbs (if any) are rudimentary, and seldom form a continuation of the sides as in Europe.

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